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FAB 3

NATURAL AND SYNTHETIC SWEETENERS

SELECTED FROM VOLUME 11
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

[Occurrence of D-mannitol in sugar beets.]
Caplovic, J.; Rendos, F.
Listy Cukrovarnicke 94 (1) 9–11 (1978) [17 ref. Sk]
[Chemicky Ústav SAV, Bratislava, Czechoslovakia]

L-arabinose has been manufactured (on half-pilot scale) from dried exhausted beet pulp. When pulps originating from deteriorated beets are used, the arabinose exhibits the presence of D-mannitol; it was separated from the L-arabinose by fractional crystallization from dil. methanol. The D-mannitol was probably present in the initial sugar beets, but it has not been detected so far in beets. It may be produced following freezing damage of the beets, similar to cane. STI

2

Long-lasting chewing gum.
Bakal, A. I.; Witzel, F.; Mackay, D. A. M.; Schoenholz, D. (Savers Inc.)
United States Patent 4 087 557 (1978) [En]

A long-lasting flavoured chewing gum contains a sweetener, saccharin or saccharin salts (0.02–15% by wt.) dispersed in an ester gum to control its rate of release from the gum base. IFT

3

[Sweetening compositions.]
Ajinomoto Co. Ltd.
Japanese Patent 5 313 700 (1978) [Ja]

A process is described for the separation of the sweet constituents from plant matter belonging to Stevia rebaudiona [rebaudiana?] Bertoni. IFT

4

Sweetening compositions.
Hoechst AG
British Patent 1 510 491 (1978) [En]

A description is given of low cal sweetening compositions which are based upon β-acyloxy-crotonic acidemido-N sulphohalides. IFT

5

Saccharin: where do we go from here?
Anon.
FDA Consumer 12 (3) 16–21 (1978) [En]

The FDA proposed its saccharin ban on April 15, 1977, but because of an unprecedented public outcry, an 18-month moratorium was passed by Congress in Nov., 1977. Consideration is given to the specific studies to be carried out in an attempt to assess the health benefits and risks of saccharin. A number of questions which have arisen as a result of the FDA's proposed ban are discussed. VJG

6

Sweetening foods with neohesperidin chalcone.
Linke, H. A. B.; Eveleigh, D. E.
United States Patent 4 087 558 (1978) [En]

Foods, e.g. beverages, candies, chewing gum, are sweetened by the incorporation of neohesperidin chalcone as a sucrose substitute. IFT

7

Artificial sweetener.
Tate & Lyle Ltd.
British Patent 1 506 052 (1978) [En]

An artificial sweetener (monellin) is extracted from the fruit of Dioscoreophyllum cumminsii by contacting it with an aqueous Al salt. IFT

8

Taste and structure relations of flavonoid compounds. [Lecture]
Horowitz, R. M.
International Congress of Food Science & Technology - Abstracts p.66 (1978) [En] [Dep. of Agric., Sci. & Education Administration, Fruit & Vegetable Chem. Lab., 263 S. Chester Ave., Pasadena, California 91106, USA]

The relation between structure and taste of flavanoids is discussed, with special reference to the bitterness of flavanone glycosides containing β-neohesperidose, vs. the tasteless nature of flavanone glycosides containing β-rutinose. Changes at selected sites in flavanone neohesperidosides may lead to bitter, bitter-sweet, sweet or tasteless products; similar changes in flavanone rutinosides lead to tasteless products. Possible applications of dihydrochalcone neohesperidosides include use as sweeteners or as debittering agents; flavone neohesperidosides, which are tasteless, are also potential debittering agents. [See FSTA (1979) **11** 2A60.] AJDW

9

[Determination of mono- and disaccharides, sorbitol and xylitol in foods by high-pressure liquid chromatography.] Über den Einsatz der Hochdruckflüssigkeitschromatographie (HPLC) zur Bestimmung von Mono- und Disacchariden sowie von Sorbit und Xylit in Lebensmitteln.
Woidich, H.; Pfannhauser, W.; Blaicher, G.
Lebensmittelchemie und Gerichtliche Chemie 32 (4) 74–76 (1978) [3 ref. De] [Forschungsinst. der Ernährungswirtschaft, Blaasstrasse 29, A-1190 Vienna, Austria]

A procedure for detn. of sugars and polyols in foods is described, based on preparation of an aqueous extract (defatted and/or clarified as necessary) and separation by high-pressure liquid chromatography on a Bondapak AX-Corasil column or a Lichrosorb-NH_2 column using an acetonitrile/water mobile phase and refractive index detection. The acetonitrile/water ratio should be selected for the analysis in progress; separation improves, retention times increase and sensitivity of refractive index detectors decreases with increasing acetonitrile concn. The relative merits of the 2 columns are compared, and their application to separation of specific mixtures of sugars and/or polyols is discussed. Problems may be experienced at very low sugar concn. and consequent high levels of detector amplification; the base-line may return to the initial line only very slowly. This problem may be minimized by dissolving the sample in a 1:1 mixture of water and 2-propanol, after which the sample is extracted with a small quantity of water, and made up to the required vol. with 2-propanol. Advantages claimed for this analytical technique include simple preparation of the sample, and

direct quantitative detn. without the need for colour reagents, etc. Sensitivity is adequate for routine use. AJDW

10

Effect of stabilizing agents and aspartame on the sensory properties of orange sherbet.
McPherson, B. A.; McGill, L. A.; Bodyfelt, F. W.
Journal of Food Science 43 (3) 935–939 (1978) [5 ref. En] [Dep. of Food Sci. & Tech., Oregon State Univ., Corvallis, Oregon 97331, USA]

An orange sherbet incorporating aspartame as a partial sweetener was formulated. Owing to a significant reduction of the TS content, the following stabilizers were used individually and in combination to determine their effectiveness in improving the sherbet quality: arabinogalactan, carrageenan, guar gum, gum arabic, gum tragacanth, locust bean gum, a proprietary ice cream stabilizer, a proprietary sherbet stabilizer, purified wood cellulose, microcrystalline cellulose, and xanthan gum. Preference tests and modified texture profiles were utilized to determine the desirability of the different sherbet formulations. After hardening and after 4 wk of −25° C storage, the formulations with 37.5% of the sweetness as aspartame with either xanthan gum or the combination of carrageenan and locust bean gum were equal in desirability to the control (sweetened conventionally and with commercial sherbet stabilizer). IFT

11

Starch: present status and future potential. [Lecture]
Whistler, L.
International Congress of Food Science & Technology - Abstracts p.11 (1978) [En] [Dep. of Biochemistry, Purdue Univ., West Lafayette, Indiana 47907, USA]

Major new food uses of starch as a low-priced polymeric material are considered in relation to glucose-fructose sweeteners and new modified starches for viscosity control and water absorption. [See FSTA (1979) 11 2A60.] ELC

12

Low calorie sweetener.
Cella, J. A.; Schmitt, W. H. (Alberto-Culver Co.)
United States Patent Reissue 29 682 (1978) [En]

A method is described for the preparation of a low cal sweetener composition containing an aspartyl dipeptide lower alkyl ester of specified formula. IFT

13

Sensory evaluation of stevioside and newly isolated diterpene glycosides as sweeteners. [Lecture]
Ishima, T.; Katayama, O.; Yokoyama, Y.
International Congress of Food Science & Technology - Abstracts p.158 (1978) [En] [Nat. Food Res. Inst., Min. of Agric. & Forestry, Shiohama, Koto-ku, Tokyo, Japan]

Stevioside and 3 other diterpene glycosides (rebaudioside A, dulcosides A and B), isolated from the leaves of Stevia rebaudiana Bertoni, were subjected to sensory evaluation. Stevioside was found to be slightly bitter, showed some astringency and aftertaste and had the lowest general acceptability; it was 240 times sweeter than 2% sucrose in aqueous solutions. Rebaudioside A had a higher general acceptability than stevioside and was 20–30% sweeter. Dulcosides A and B were similar to rebaudioside A in taste quality and were 50–60% sweeter than a 1% sucrose solution. [See FSTA (1979) 11 2A60.] JA

14

Taste-structure activity relationship in intensely sweet chlorodeoxysucrose analogues. [Lecture]
Khan, R.; Lee, C. K.
International Congress of Food Science & Technology - Abstracts p. 159 (1978) [En] [Tate & Lyle Ltd., Philip Lyle Memorial Res. Lab., Univ. of Reading, Whiteknights, PO Box 68, Reading RG6 2RX, UK]

The discovery that 1',4,6,6'- tetrachloro-1',4,6,6'-tetradeoxy galacto sucrose was 200× sweeter than sucrose, led us to an investigation of the relationship between structure and sweetness enhancement in chlorodeoxy derivatives of sucrose. A range of mono-, di-, tri- and tetra-chlorodeoxy sucroses were prepared, and their sweetness intensities were measured. On the basis of these results and in the light of existing theories on sweetness, the structure and sweetness relationship of our intensely sweet chlorodeoxy sucrose derivatives were examined. [See FSTA (1979) 11 2A60.] AS

15

Xylitol - non-cariogenic sweetener.
Craig, J. T.
Food Technology in New Zealand 12 (5) 27, 29–30 (1977) [17 ref. En] [Chem. Dep., Victoria Univ. of Wellington, Wellington, New Zealand]

The results of human feeding trials with xylitol as a replacement for, and in addition to, sucrose as a sweetener are reviewed; xylitol is claimed to reduce the incidence of dental caries in both modes of consumption. Xylitol is most economically produced from xylose by catalytic hydrogenation. Xylose occurs widely in plant materials, and might be extractable in pure form from beech or corn cobs in New Zealand. JRR

16

Alternate sweeteners.
Anon.
Food Processing 38 (5) 50–52 (1977) [En]

Alternatives to the use of saccharin, contingent upon a ban by the US FDA, are discussed: fructose in cool, weak solution at low pH has a sweetness value of 140–150 (sucrose = 100), and the sweetness of fructose/sucrose solution is enhanced synergistically. Glycyrrhizins in powder form are available, some with reduced licorice flavour. The sweetness is approx. 50 times that of sucrose. Xylitol is also available, though its sweetness and calorific content are similar to those of sucrose. Cyclamates, dihydrochalcones and aspartame are briefly discussed as sweeteners which may shortly receive FDA approval, and sweeteners undergoing

laboratory development are mentioned, viz. acetosulfam, D-6-chlorotryptophan, miraculin and monellin. JRR

17

Synthesis and taste of some glycosides of glycyrrhetic acid.
Esaki, S.; Konishi, F.; Kamiya, S.
Agricultural and Biological Chemistry 42 (8) 1599–1600 (1978) [10 ref. En] [Food Chem. Lab., Shizuoka Women's Univ., Yada 409, Shizuoka City, Japan]

Analogues of glycyrrhizin, an intensely sweet glycosidic constituent of liquorice root were synthesized. Glycyrrhizin is a 3-OH derivative of glycyrrhetic acid (a triterpene), viz. glycyrrhetic acid-3-O-[2-O-β-D-glucopyranuronosyl-β-D-glucopyranuronoside]. The compounds synthesized were glycyrrhetic acid-3-O-[2-O-β-D-glucopyranosyl-β-D-glucopyranoside];glycyrrhetic acid-3-O-[2-O-α-D-glucopyranosyl-β-D-glucopyranoside];and glycyrrhetic acid-3-O-[2-O-α-L-rhamnopyranosyl-β-D-galactopyranoside]. These synthesized compounds were only slightly sweet (listed in order of increasing intensity) vs. glycyrrhizin, which is 50–100 × as sweet. This was unexpected as the compounds all possessed structural features of the aglycone and disaccharide which have been pointed out as common to a group of intensely sweet natural glycosides. DIH

18

Qualitative psychophysical studies on the gustatory effects of the sweet tasting proteins thaumatin and monellin.
Wel, H. van der; Arvidson, K.
Chemical Senses and Flavor 3 (3) 291–297 (1978) [31 ref. En] [Unilever Res., Vlaardingen, Netherlands]

The gustatory effects of the sweet tasting proteins thaumatin and monellin were studied after application to small areas on the anterior third of the tongue or to single fungiform papillae. The sweet sensation caused by thaumatin and monellin developed more slowly, but reached a higher intensity and had a longer duration than that given by sucrose. Also, the response evoked by these sweet tasting proteins was more pronounced at the lateral edges, whereas that evoked by sucrose was stronger at the tip of the tongue. The taste modifier, miraculin, had no noticeable effect on the sweet taste elicited by thaumatin, monellin and sucrose. Gymnemic acid abolished the sweet taste of all three compounds. Experiments with time intervals of <1 min between stimuli showed strong cross-adaptation between thaumatin and monellin, between the 2 proteins and sucrose, and between the 2 proteins and miraculine-induced sweet taste of citric acid. While the differences in response to the sweet tasting proteins and sucrose may be taken as evidence in favour of the existence of >1 kind of sweet receptor, the cross-adaptation noted between the various substances tested would seem to indicate that, at some point, they engage a common neural mechanism. AS

19

Enhancement of oncogenesis in C3H/10T1/2 mouse embryo cell cultures by saccharin.
Mondal, S.; Brankow, D. W.; Heidelberger, C.
Science, USA 201 (4361) 1141–1142 (1978) [22 ref. En] [Univ. of Southern California, Comprehensive Cancer Cent., Los Angeles, California 90033, USA]

Impure and pure samples of saccharin (2 mg/ml) did not produce oncogenic transformation of C3H/10T1/2, clone 8, mouse embryo fibroblasts. However after treatment of the cells with a nontransforming initiating dose (0.1 μg/ml) of 3-methylcholanthrene, continuous treatment with either sample of saccharin (100 μg/ml) led to significant transformation. It is concluded that in this system saccharin is a cocarcinogen, probably functioning as a promoting agent that is 1000-fold less active than the tumour promoter 12-O-tetradecanoyl-phorbol-13-acetate. AS

20

[New low-energy and diabetic products from the brewing industry.]
Markvart, J.
Prumysl Potravin 29 (4) 191–192 (1978) [Cs] [Pivovary a Sladovny, Generalni Reditelstvi, Prague, Czechoslovakia]

It follows from decisions made in 1977 for the Czechoslovak brewing industry that 40% of lemonade production will remain at the so far customary sugar content of 9° refraction, and 60% will be gradually reduced to 5° refraction strength; manufacture of 30% of such reduced-strength lemonades had already begun. Diabetic 4° refraction beverages are being manufactured from a syrup of fructose, sorbitol and saccharin, and mannitol and xylitol are also used. Pectin and cellulose derivatives are allowed without limitation. Maltol is used to mask the taste of saccharin. Research is proceeding on use of a number of synthetic sweeteners including those based on dihydrochalcone (hesperidin, neohesperidin, naringin) or on proteins or polypeptides (monellin, thaumatin); and aspartame (APM, MEFA) is being intensively studied, the general intention being to move away from saccharin and, possibly, cyclamates. SKK

21

Activated sludge system helps Corn Sweeteners solve expansion problems.
Anon.
Food Production/Management 100 (10) 8–9 (1978) [En]

The expanded water treatment facilities of the Corn Sweeteners Div. of Archer Daniels Midland Ltd., at Cedar Rapids, Iowa, USA are described. To alleviate the load on municipal sewage treatment created by corn wet milling, a plant consisting of sludge removal clarifiers, cyclone degritting equipment (Dorr-Oliver), a rotary strainer and a sludge centrifuge was installed, with a capacity of 3 million gal/day throughput and 12 million gal holding capacity. The system requires no drying beds, and waste material removal rate is $>90\%$. JRR

22

[Detection and determination of artificial sweeteners in foods. I. Detection of saccharin, cyclamate and dulcin.]
Lemieszek-Chodorowska, K.
Roczniki Panstwowego Zakladu Higieny 29 (3) 271–277 (1978) [12 ref. Pl, ru, en] [Zaklad Badania Zywnosci i Przedmiotow Uzytku, Panstwowy Zaklad Higieny, Warsaw, Poland]

A modified TLC method with column purification was used to detect and identify saccharin, cyclamate and dulcin in various foods (laboratory made cherry, blackcurrant and redcurrant juices; commercial strawberry, cherry and greengage jams). Silica gel G (Merck), 0.25 mm thickness, was used to coat the plates, and n-propanol + 25% NH_4OH (4 + 1) or acetone + 10% NH_4OH were used as developers; the spraying agents were (i) 2,7-dichlorofluorescein or (ii) pinacryptol yellow. In UV light (366 nm), (i) enabled 2, 4 and 4 μg of dulcin, calcium saccharin and calcium cyclamate to be detected resp.; corresponding figures were 2, 20 and 20 μg with (ii). Concn. of the various sweeteners of ≥ 12.5 mg/l. or /kg were found in the juices and jams. HBr

23

Natural high-intensity sweeteners.
Parker, K. J.
BNF Bulletin No. 16, 240–245 (1976) [23 ref. En] [Tate & Lyle Ltd., Philip Lyle Memorial Res. Lab., Univ., Whiteknights, Reading, Berks., UK]

Non-nitrogenous natural sweeteners (glycyrrhizin, stevioside, Osladin) and protein sweeteners (miraculin, monellin, thaumatin, and aspartame) are described. AL

24

Sweetening of coffee and tea with fructose-saccharin mixtures.
Hyvönen, L.; Kurkela, R.; Koivistoinen, P.; Ratilainen, A.
Journal of Food Science 43 (5) 1577–1579, 1584 (1978) [12 ref. En] [Dep. of Food Chem. & Techn., Univ. of Helsinki, 00710 Helsinki 71, Finland]

For reducing the calories from coffee and tea without reducing the conventional sweetness, drinks sweetened with mixtures of fructose and saccharin were prepared. Mixtures of fructose and saccharin, the sweetness of which in coffee, lemon tea and iced lemon tea corresponded to that of 5% sucrose in the drinks, were prepared. Magnitude estimation and forced-choice paired comparison tests were used as methods. Using a triangle test with a trained panel it was checked whether the mixture-sweetened drinks were distinguishable from those sweetened with sucrose. In consumer tests a single sample test was used. Energy saving of 50–70% compared with equally sweet sucrose-sweetened coffee and tea could be achieved without deterioration of other taste qualities. IFT

25

Sweetening of soft drinks with mixtures of sugars and saccharin.
Hyvönen, L.; Koivistoinen, P.; Ratilainen, A.
Journal of Food Science 43 (5) 1580–1584 (1978) [14 ref. En] [Dep. of Food Chem. & Tech., Univ. of Helsinki, 00710 Helsinki 71, Finland]

Low-calorie base and cola-type soft drinks were prepared using 10% sucrose isosweet sugar-saccharin mixtures as sweeteners. The proportion of saccharin in the mixture, in which the aftertaste of saccharin was not noticed, was determined by an experienced taste panel. The equality of the sweetness of mixtures and 10% sucrose in the drinks was determined by the forced-choice paired comparison method. The noticeable differences between mixture-sweetened and sucrose-sweetened drinks were checked in the triangle test. The preferences for the drinks were tested by rank order and hedonic scaling test. The test drinks were also compared with corresponding commercial beverages. In consumer tests it was checked whether the mixture-sweetened drink was distinguishable from the sucrose-sweetened one in a normal condition of drinking, using single sample test. In consumer tests preferences were also tested by ranking. The following conclusions were drawn. To avoid aftertaste the proportion of saccharin in the sugar-saccharin mixture cannot be > 0.3% for sweetening cola-type or > 0.4% for citrus-type soft drinks at the sweetness level of 10% sucrose. The test soft drinks sweetened with mixtures of sugar and saccharin were judged as good as or better than the corresponding conventional drinks on the market. Depending on the sugar component of the mixture the energy content of the drinks was 50–70% lower than that of the isosweet sucrose-sweetened one. [See also preceding abstr.] IFT

26

[Artificial sweeteners in foods. I. Replacement of sugar by low-calorie sweeteners in soft drinks.]
Netherlands, Voedingsraad
Voeding 39 (12) 356–364 (1978) [20 ref. Nl, en]

Aspects discussed include: trends in per capita consumption of sugars in the Netherlands; industrial use of sugars; the desirability of reduction of sugar intake; sugar consumption in soft drinks; soft drink consumption by various age and sex groups in the Netherlands; and the potential for reduction of the sugar consumption via soft drinks, by use of artificial sweeteners, use of sugar (e.g. fructose) with a high sweetening capacity, reduction of the sugar content of soft drinks, or reduction of soft drink consumption. Recommendations for reduction of sugar consumption via soft drinks are given. AJDW

27

The development of natural sweeteners as alternatives to cane and beet sugar.
Smith, I.
Journal of Agricultural Economics 29 (2) 155–163 (1978) [8 ref. En, fr, de] [Univ., Newcastle upon Tyne, UK]

Sugar, or sucrose, is by far the most important natural sweetener. Alternatives to sugar, e.g. glucose and dextrose derived from starch, are not as sweet as sucrose and are therefore not perfect substitutes. The recent discovery of isomerase, which converts glucose into fructose, has resulted in a new liquid sweetener similar to liquid invert sugar. The product is isomerase glucose syrup (isoglucose), better known as high

fructose glucose syrup (HFGS), and is suitable for most products which are manufactured using liquid sugar. Production of HFGS was stimulated by the world sugar shortage and high prices of 1974, and it has already made important inroads into the market for sweeteners in the USA. It is beginning to appear in other industrialised markets, e.g. Japan and the European Community. The EEC Council of Agricultural Ministers has imposed a levy on the production of HFGS in order to protect Community beet farmers. This paper examines recent developments in sweetener markets and considers their implications for policy and for world trade in sugar. AS

28

[Determination of saccharin in artificial sweeteners and dietetic beverages.]
Sulkowska, J.; Charlampowicz, L.
Prace Instytutow i Laboratoriow Badawczych Przemyslu Spozywczego 27 (2) 153–161 (1977) [17 ref. Pl, en, ru] [Cent. Lab. Przemyslu Koncentratow Spozywczych, Poland]

The total N is the basis of the detn.; the method is applicable to samples free from ammonium salts and organic N. Polish diabetin and West German sinon were tested. The sample wt. were pure saccharin 0.1–0.2 g, and 4–5 g of dietetic beverages. For Kjeldahl digestion 10 g of catalyst and 60 ml of conc. H_2SO_4 are used at a temp. of 360–380°C. The method is suitable for series analyses; the analysis time is 8 h, and can be reduced to 4–5 h if Büch apparatus is used. High accuracy of the method was proved by statistical analysis; 97% of added saccharin was recovered in 2 beverage assays. STI

29

Xylitol. [Book]
Counsell, J. N. (Editor)
xiv + 191pp. ISBN 0-85334-786-7 (1978) [many ref. En]
Barking, Essex, UK; Applied Science Publishers Ltd.
Price £12.00 [Tech. Cent., Roche Products Ltd., Chemicals Div., Dunstable, UK]

This book contains papers presented at an International Symposium organized and sponsored by Roche Products Ltd. and Xyrofin Ltd. at the Europa Hotel, London on 5 May 1977. Papers are: The occurrence, manufacture and properties of xylitol, by C. Aminoff, E. Vanninen & T. E. Doty (pp. 1–9, 14 ref.); The value of xylitol as an ingredient in confectionery, by F. Voirol (pp. 11–20); Some aspects of food technology, by F. Kracher (pp. 21–24); Discussion on xylitol as a new ingredient (pp. 25–33); Biochemistry of xylitol, by K. H. Bässler (pp. 35–41, 17 ref.); Tolerance in the human. Adults and children, by H. Förster (pp. 43–66, 41 ref.); Biochemical findings in exocrine secretions in relation to peroral administration of xylitol, by K. K. Mäkinen (pp. 67–102, 24 ref.); Discussion on biochemical aspects (pp. 103–109); Cariogenic bacteria, by F. Gehring (pp. 111–132, 34 ref.); Behaviour of xylitol in isolated plaque, by G. Frostell (pp. 133–138, 14 ref.); Incidence of clinical and experimental caries in relation to microbiological and biochemical xylitol-induced effects, by A. Scheinin (pp. 139–161, 35 ref.); Some aspects of forthcoming research on xylitol, by F. Gey (pp. 163–174, 20 ref.); and Discussion on dental aspects (pp. 175–185). An index is included. AL

30

High-performance liquid chromatographic determination of Stevia components on a hydrophilic packed column.
Hashimoto, Y.; Moriyasu, M.; Nakamura, S.; Ishiguro, S.; Komuro, M.
Journal of Chromatography 161, 403–405 (1978) [7 ref. En] [Kobe Women's Coll. of Pharmacy, Motoyamakita-machi, Higashinada-ku, Kobe, 658, Japan]

The main sweet components contained in the leaves of Stevia rebaudiana Bertoni are (i) stevioside and (ii) rebaudioside A, the latter being the sweeter. This paper describes their detn. by high-performance liquid chromatography using a Shodex OHpak M-414 column (50 cm × 4 mm) with mobile phase of acetonitrile/water (4:1) and flow rate 0.5 ml/min, and using a high-sensitivity refractive index detector. Detection of about 2 µg of (i) and (ii) was possible. Contents of (i) and (ii) found in 8 samples of the extract of Stevia leaves from Japan, Korea, Brazil and Paraguay were 2.0–7.7% and 0.8–2.9% resp. AL

31

[Botanical and commercial identification of Stevia rebaudiana (Bertoni) Hemsl., a plant yielding a sweetening agent.] Botanisch-warenkundliche Diagnostik von Stevia rebaudiana (Bertoni) Hemsl., einer süßstoffliefernden Pflanze.
Hohmann, B.
Deutsche Lebensmittel-Rundschau 74 (8) 296–299 (1978) [13 ref. De, en, fr] [Abteilung Warenkunde, Inst. für Angewandte Bot., Univ. Hamburg, Federal Republic of Germany]

Stevia rebaudiana is the source of stevioside, a diterpene glycoside of potential use as a sweetening agent for foods. Microscopic characteristics for botanical and commercial identification of this plant are described, with the aid of illustrations. AJDW

32

Flavonoid sweeteners. Synthesis and intestinal absorption of selected sulfoalkylated hesperetin-3-^{14}C derivatives in the rat.
Brown, J. P.; Crosby, G. A.; DuBois, G. E.; Enderlin, F. E.; Hale, R. L.; Wingard, R. E.
Journal of Agricultural and Food Chemistry 26 (6) 1418–1422 (1978) [22 ref. En] [Biol. Sci. & Chem. Synthesis Lab., Dynapol, Palo Alto, California 94304, USA]

The intestinal absorption of 4 sulphoalkyl derivatives of [3-^{14}C] hesperetin and hesperetin [β-^{14}C]dihydrochalcone (DHC) was determined with bile duct ligated rats. While absorption, as indicated by urinary excretion, $^{14}CO_2$ expiration and residual tissue activity, is nearly complete for [3-^{14}C]hesperetin (91% of dose), the sulphoalkyl derivatives exhibited apparent minimal metabolism and a greatly reduced intestinal absorption. The absorption was found, as expected, to be inversely proportional to mol. wt. and charge. Absorption ranged from 23% for 7-O-sulphopropyl[3-^{14}C]hesperetin (mol. wt. 424, acid form) to 1.2% for a DHC dimer (mol. wt. 985, acid form). These results prove feasible the concept of preparing relatively low mol. wt., nonglycosidic flavonoid sweeteners possessing limited intestinal absorption and metabolism. AS

33

Spectrophotometric determination of saccharin in soft drinks using chlorophenothiazine as reagent.
Ramappa, P. G.; Sanke Gowda, H.
Zeitschrift für Analytische Chemie 292 (5) 413 (1978) [En] [Univ. of Mysore, Manasa Gangotri, Mysore 570 006, India]

Working directions are given for extractive spectrophotometric detn. of saccharin in soft drinks through formation of red colour with chlorophenothiazine. A linear response is obtained over concn. 20–400 p.p.m. (optimum concn. 30–380 p.p.m.). Sensitivity is 59 ng/cm^2 and relative error ±2%. 97–101% recoveries were achieved for 100–150 p.p.m. saccharin added to various soft drinks (fruit juices). RM

34

Sweeteners in biscuits and crackers.
Hickenbottom, J. W.
Bakers' Digest 51 (6) 18–22 (1977) [En] [Malt Products Corp., Greenwich, Connecticut, USA]

The many types of sweetener available to the baker for use in biscuit and cracker manufacture are described, and their uses and relative merits discussed, including cane and beet sucrose, invert sugar, brown sugar, corn sweeteners, malt products and honey. JRR

35

Determination of o-toluenesulfonamide in artificial sweeteners containing saccharin.
Kacprzak, J. L.
Journal of the Association of Official Analytical Chemists 61 (6) 1528–1532 (1978) [6 ref. En] [Health Commission of NSW, Div. of Analytical Lab., PO Box 162, Lidcombe, NSW 2141, Australia]

A GLC procedure with p-toluenesulphonamide (p-TS) as an internal standard is used to determine o-toluene-sulphonamide (o-TS), a major impurity in artificial sweetening substances containing saccharin. Although p-TS can itself occur as an impurity in samples, it is usually absent or present in very small amounts; the highest quantity found in the 13 samples analysed was about 1 p.p.m. The presence of appreciable amounts, however, would not pose a problem with the GLC procedure. Recoveries of standard o-TS added at various levels were approx. 90%. AS

36

Survey of analytical methods available for the estimation of artificial sweeteners in food.
Page, B. D.; Conacher, H. B. S. (International Union of Pure & Applied Chemistry, Commission on Food Additives)
Pure and Applied Chemistry 50 (3) 243–254 (1978) [many ref. En] [Food Res. Div., Health & Welfare Canada, Ottawa, Ontario K1A 0L2, Canada]

Methods available for the detn. of several artificial sweeteners in foods are reviewed. The sweeteners include: cyclamates (pp. 245–248, 61 ref.); saccharin (pp. 249–251, 46 ref.); polyhydric alcohols, i.e. D-glucitol (sorbitol), D-mannitol and D-xylitol (pp. 252–253, 19 ref.); aspartame (INN) (pp. 253–254, 3 ref.); glycyrrhizin (p. 254, 3 ref.); and dihydrochalcones (p. 254, 1 ref.). AL

37

Preparation and evaluation of commercial ammoniated glycyrrhizin.
Nour, M. G.; El-Taie, N. H.; Shabana, M.
Egyptian Journal of Pharmaceutical Sciences 17 (3) 283–289 (1976) [16 ref. En, ar] [Misr Co. for Pharmaceuticals, Post El Zeiton, Cairo, Egypt]

A new, simple and accurate spectrophotometric method for assay of glycyrrhizin in liquorice roots, dried extracts and commercial glycyrrhizin is described. The method is based on measuring UV absorbance at 258 nm of glycyrrhizin eluted from an acid alumina column. The free aglycone, glycyrrhetinic acid, is removed by prior extraction with chloroform. Other interfering substances and colouring matter are either adsorbed on the alumina column or removed first by washing the column with aqueous acetone then water. Finally, pure glycyrrhizin is eluted quantitatively from the column using 0.1% ammonia solution. TLC is used to check the purity of the eluate. Using a known quantity of an authentic sample of pure ammonium glycyrrhizinate in a parallel assay by the column chromatographic method, a 100% recovery was obtained. Comparative analysis of this method with 2 USSR State Pharmacopoeia methods on liquorice roots, dried extracts and ammoniated glycyrrhizin preparations was carried out and the results are tabulated. SP

38

[The saccharin problem.]
Lederer, J.
Medecine et Nutrition 13 (1) 23–32 (1977) [51 ref. Fr] [Ecole de Sante Publique, Univ. de Louvain, 1150 Brussels, Belgium]

The synthesis, purity, stability, absorption, excretion, metabolism, carcinogenic activity and teratogenic activity of saccharin are discussed on the basis of literature data. A description is given of studies on effects of treatment (intraperitonally or in the diet) with saccharin, its metabolites or its common contaminants on the reproductive performance of Wistar rats. The rats were treated with the materials under test from the 1st–18th or 9th–18th days of gestation; they were killed on the 20th day of gestation, and the placenta and embryos examined. Tables of results are given. The results show that saccharin prepared by the Remsen & Fahlberg method caused increased foetal resorption when rats were exposed to doses of ≥10 mg intraperitonally, or 0.3% in the diet. Saccharin prepared by the Maumee method did not cause increased foetal resorption when rats were exposed to doses of 3% in the diet. Of the metabolites and impurities, sulphamoylbenzoic acid, o-sulphobenzoic acid and ammonium o-sulphobenzoic acid causes increased foetal resorption. It is therefore suggested that only high-purity saccharin should be used in foods. AJDW

39

Artificial sweetener.
Tate & Lyle Ltd.
British Patent 1 525 131 (1978) [En]

The sweetening capabilities of protein and saccharin sweeteners are enhanced by incorporation of arabino galactan, and can be used for low calorie food and drinks. IFT

40

Dihydrochalcone type sweetening agents. I. Structure-taste relationships.
Antus, S.; Farkas, L.; Gottsegen, A.; Nogradi, M.; Pfliegel, T.
Acta Chimica Academiae Scientiarum Hungaricae 98 (2) 225–230 (1978) [16 ref. En] [Hungarian Acad. of Sci., POB 91, H-1521 Budapest, Hungary]

A systematic investigation of the structure-taste relationships in a series of 43 dihydrochalcones was carried out; chemical structure and taste of the compounds are given. An intensively and purely sweet atoxic compound, 1-[2-hydroxy-4-(3-sulpho-1-propyloxy)-phenyl]-3-(3-hydroxy-4-methoxyphenyl)-propan-1-one sodium salt, named chinoin-401, was developed, which has appreciable commercial potential. Synthesis [see following abstr.] is unsophisticated and starts from relatively inexpensive starting materials, viz. resorcinol and isovanillin. Compared with 1% sucrose solution, chinoin-401 is 1500 ± 300 × sweeter. Sweetness intensity, however, drops with increasing concn. and the factor is only 220 compared with 10% sucrose solution. Tests in representative food preparations and beverages are said to give favourable results in general, except in coffee. LD_{50} was >5000 mg/kg in rats, and subacute feeding of 10-250 mg/kg to rats daily for 3 months produced no pathological or other changes. AL

41

Dihydrochalcone type sweetening agents. II. The synthesis of some dihydrochalcones.
Antus, S.; Farkas, L.; Gottsegen, A.; Nogradi, M.; Strelisky, J.; Pfliegel, T.
Acta Chimica Academiae Scientiarum Hungaricae 98 (2) 231–240 (1978) [18 ref. En] [Hungarian Acad. of Sci., POB 91, H-1521 Budapest, Hungary]

The preparation of 33 new dihydrochalcones by condensation of acetophenones and aldehydes to chalcones followed by hydrogenation is reported. AS

42

The Delaney myths.
Henteleff, T. O.
Food Drug Cosmetic Law Journal 33 (8) 396–404 (1978) [En]

In connection with the public reaction to the US original proposal to ban the use of saccharin under the Delaney Clause, misconceptions and misunderstandings connected with the Clause are discussed from the lawyer's viewpoint. The Clause provides that a food additive should be considered unsafe "if it is found to induce cancer when ingested by man or animal, or if it is found, after tests which are appropriate for the evaluation of the safety of food additives, to induce cancer in man or animal". Problems of definition of "food additives", the generally regarded as safe (GRAS) concept, pesticide chemicals and exceptions to the Delaney Clause are discussed. The author proposes that the US FDA should be permitted to give a label warning instead of imposing a total ban, e.g. in cases where probable benefits outweigh potential risks. HBr

43

The nature of regulatory choices.
Crout, J. R.
Food Drug Cosmetic Law Journal 33 (8) 413–423 (1978) [En]

The author discusses the complex problems involved in the decision to ban or not a specific product, by reference to saccharin and laetrile (an untested cancer remedy). He emphasizes that there are few clear-cut cases, inasmuch as the benefit/risk relationship is multifaceted, and that the risks are frequently very low in comparison with such products as tobacco and alcohol. HBr

44

[Microscopic identification of the fruit of Synsepalum dulcificium (DC) Daniell, a berry transforming sour into sweet taste.] Zur mikroskopischen Diagnostik der Frucht von Synsepalum dulcificium (DC) Daniell, einer sauren in süssen Geschmack umwandelnden Beere.
Hohmann, B.
Deutsche Lebensmittel-Rundschau 74 (12) 434–438 (1978) [18 ref. De, en, fr] [Inst. für Angewandte Bot., Univ. Hamburg, Federal Republic of Germany]

Macroscopic and microscopic characteristics of value for characterization of Synsepalum dulcificium berries, the source of the taste-modifying protein miraculin, are discussed in relation to the need for identification of these berries in the context of trade. Characteristics of miraculin are also briefly considered. AJDW

45

[Thin layer chromatographic detection of acesulpham, saccharin and cyclamate.] Dünnschichtchromatographischer Nachweis von Acesulfam, Saccharin und Cyclamat.
Rymon Lipinski, G.-W. von; Brixius, H.-C.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 168 (3) 212–213 (1979) [2 ref. De, en] [Hoechst Aktiengesellschaft, D-6230 Frankfurt/Main 80, Federal Republic of Germany]

A procedure for detection of the synthetic sweeteners acesulpham, saccharin and cyclamate in foods is described. Sweeteners are extracted from an acidified sample of the material under test by the method of Woidich et al. [FSTA (1969) 1 6T176] using liquid ion exchange resin. The sweeteners are then re-extracted into dilute ammonia solution, the extract is evaporated to dryness, and the residue is dissolved in 50% methanol and separated by TLC on polyamide plates using a xylene/n-propanol/formic acid solvent system. The individual sweeteners may be detected on the basis of the Rf values of the appropriate flecks after spraying

the plates with methanolic fluorescein followed by treatment with Br vapour then NH_3 vapour. Detection limit is approx. 2 μg sweetener. AJDW

46

[Technological progress with immobilized enzymes.]
Baret, J. L.
Industries Alimentaires et Agricoles 95 (9/10) 957–962 (1978) [4 ref. Fr, de, en]

Various methods for up grading whey and milk permeate are presented including lactose hydrolysis, the key step to hydrolysed lactose syrup (HLS). Main attention is focussed on the Corning immobilized lactase system. The pilot unit is described with the aid of a flow sheet and operating characteristics and performance of a reactor are briefly reviewed; nominal output is 350 l./h, and with initial lactose concn. 50 g/l. 80% hydrolysis is achieved to 10 g residual lactose, and 21 g each of glucose and galactose. After concn. the product has attractive applications as a sweetener or a fermentation substrate. A plant for treating 100 000–400 000 l. whey/day is envisaged. RM

47

[Additives in baby foods and dietetic products.]
Briski, B.
Hrana i Ishrana 19 (5/6) 273–278 (1978) [Sh, en] [Odjel za Higijenu Prehrane Zavoda za Zastitu Zdravlja SRH, Zagreb, Yugoslavia]

Yugoslavian legislation for use of additives in baby foods and dietetic products are compared with recommendations of international agencies; differences are summarized in tables. Practical implications of the differences are discussed. The need for long-term animal feeding trials to evaluate the safety of saccharin, cyclamate and xylitol in foods for infants is briefly considered. IN

48

Xylitol-coated gum.
Fronczkowski, P. R.; Friello, D. R. (Life Savers Inc.)
United States Patent 4 127 677 (1978) [En]

A process is described for the production of xylitol-coated chewing gum in which a gum centre is coated with a syrup containing 55–70% solids of which 95–99.5% is xylitol. IFT

49

[Detection and determination of artificial sweeteners in foods. II. Determination of saccharin.]
Lemieszek-Chodorowska, K.
Roczniki Panstwowego Zakladu Higieny 29 (4) 405–409 (1978) [16 ref. Pl, ru, en] [Zaklad Badania Zywnosci i Przedmiotow Vzytku Panstwowego Zakladu Higieny, Warsaw, Poland]

Detn. of saccharin in fruit juices (cherry, apple) soft drinks and low sugar (plum) jams was performed after adaptation and modification of the colorimetric method of Fernandez-Flores et al. [see FSTA (1974) 6 4T173] with phenol and sulphuric acid. Measurements were accomplished at 557 nm using a Specol spectrophotometer with 1 cm cell. 85 samples were fortified with calcium saccharin at 10–40 mg/100 g (corresponding to 4–16 mg imide); average recovery was 96.7% (range, 72.5–127.5%). [See FSTA (1979) 11 3T121 for part I.] AS

50

[Effect of relative humidity of air on agglomeration of sugar, 'low-calorie' sugar and sorbitol.]
Jankun, J.; Pazola, Z.
Przemysl Spozywczy 32 (10) 370–371 (1978) [8 ref. Pl, ru, en, fr, de]

Using a Glatt UNI laboratory installation [see FSTA (1977) 9 6L466] instantization of (i) sucrose, (ii) a sucrose/saccharin mixture (99.77% sucrose and 0.23% saccharin, twice as sweet as sucrose and used in low-calorie diets), or (iii) sorbitol used for diabetics was studied at different RH of air at entry into the agglomerator. It is concluded from experiments carried out at 5–10, 50–55 or 85–90% RH, that the agglomeration process of (i) and (ii) may be intensified by shortening the moistening phase; and that with (iii), air RH has no substantial effect on the max. intensity of moistening in the linked process of agglomeration/crystallization of sorbitol. SKK

51

[Investigations on panela. I. Characteristic composition and colour.]
Moncada, F. R.; Sarmiento, G. R.
Revista del Instituto de Investigaciones Technologicas 20 (112) 22–43 (1978) [Es]

65 samples of panela (a sweetener produced from processing cane sugar juice and used extensively in S. America) from 52 cane sugar mills, 25 samples of cane juice and 3 of cachaza (dregs floating on the surface of the boiled juice) were analysed with the aim of providing a basis for quality standards and grading. Results (min., max., mean, s.d.) for pH, colour, turbidity, contents of moisture, reducing sugars, sucrose, N, protein, ash, K, Mg, Ca, P, and Fe and the presence of synthetic colours are tabulated. 2 types of adulteration were detected: refined sugar, which reduces the product's nutritive value by diluting the protein and mineral constituents, and synthetic colours (mainly aniline Orange L) which in addition to masking the nature of the product may present a health hazard. Mean values for panela without added sugar included (results for product with sugar in parentheses): pH 6.02 (6.03); colour (% transmittance at 550 nm) 58.46 (70.35); turbidity (at 620 nm) 51.54% (65.92); reducing sugars 7.94% (5.39); sucrose 83.09% (87.20); protein 0.61% (0.32); and ash 1.34% (0.48). RM

52

[Effect of different sweeteners and additives on acidification of frozen yoghurt.]
Gautneb, T.; Steinsholt, K.; Abrahamsen, R. K.
Meieriposten 68 (3) 68–72 (1979) [9 ref. No]

Comparison of acidification rates of yoghurt cultures in different milk media revealed that acidification was slowest in skim-milk from the Norwegian Dairy Research Institute (Forsoksmeieri), slightly faster in reconstituted Oxoid skim-milk, and varied widely in reconstituted dried skim-milks originating from 5 different drying factories. One of these reconstituted

milks, which reached the requisite pH over 1 h earlier than the Forsoksmeieri skim-milk, was selected for study of the effects of different sweeteners, stabilizers and emulsifiers on acidification of frozen yoghurt. It was found that a sweetener for diabetics, comprising 99.9% sorbitol and 0.1% saccharin, greatly inhibited acidification. Mixtures of sucrose, dextrose and glucose, as used in ordinary ice cream, were found suitable for sweetening frozen yoghurt, provided that half of the sweetener was not added until after acidification. In all cases, the yoghurt mix (with 10.5% milk SNF, 7% milk fat and a sweetness corresponding to 12% sucrose) was inoculated at 43°C with 3% culture and incubated for about 18 h (to about pH 4.3) before freezing. The stabilizer/emulsifier Palsgaard 5909 (Emulsion A/S) gave excellent results: it did not inhibit acidification, and product viscosity and consistency were good. The gelatin stabilizers Smaragd 126 and Bergkristall 418 (Nienburger Gelatin GmbH) also gave good results, especially when combined with the emulsifier Cremodan Super (Grindstedvaerket A/S). The other 5 stabilizers and 2 emulsifiers tested were less satisfactory. ADL

53

[Saccharin production.]
Ihara Chemicals Co. Ltd.
Japanese Examined Patent 5 337 862 (1978) [Ja]

Process is described for production of saccharin by converting o-chloro-benzoic acid to o-sulphonamido-benzoic acid alkyl ester with simultaneous cyclization. IFT

54

Sweet material.
Wagner, H.; Maierhofer, A. (Deutsche Gold & Silber-Scheideanstalt, vormals Roessler)
United States Patent 4 119 738 (1978) [En]

A variety of foods and beverages are sweetened by incorporation of salts of 2-hydroxy-4-methyl valeric acid, and its salts (preferably Na and K salts). IFT

55

Sensory properties of high fructose corn syrup ice cream formulations.
Pearson, A. M.; Ennis, D. M.
Journal of Food Science 44 (3) 810–812 (1979) [En]
[Dep. of Food Sci., Univ. of Guelph, Guelph, Ontario, N1G 2W1, Canada]

Ice cream formulations containing varying levels of high fructose corn syrup (HFCS) and corn sweeteners of differing DE were compared on preference and 3 sensory components with a sucrose control by 160 untrained panelists. The sensory components studied were sweetness, mouthfeel and gumminess. Significant improvement in preference was found with the HFCS ice cream formulation relative to the sucrose control with increasing concn. of corn sweeteners up to about 33% of total sweetener at 28–31 DE corn sweetener. A very high correlation between preference and mouthfeel was found yielding a multiple R^2 of 0.98 of which >96% was due to mouthfeel in the multiple regression model relating preference to sweetness, mouthfeel and gumminess. IFT

56

[Analytical characterization of Palatinit.] Analytische Charakterisierung von Palatinit.
Gau, W.; Kurz, J.; Müller, L.; Fischer, E.; Steinle, G.; Grupp, U.; Siebert, G.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 168 (2) 125–130 (1979) [9 ref. De, en]
[Pharma-Forschungszentrum, Bayer AG, D-5600 Wuppertal 1, Federal Republic of Germany]

The commercial product Palatinit (registered trademark of Süddeutsche Zucker AG, Mannheim, Federal Republic of Germany) is a mixture of equal amounts of α-D-glucopyranosido-1,6-sorbitol and α-D-glucopyranosido-1,6-mannitol, which arises from the catalytic hydrogenation of isomaltulose. Because of its potential use in foods as a sugar substitute, Palatinit was analytically characterized and detn. methods were developed. Properties and methods reported in detail for the disaccharide-alcohols and their derivatives (especially the nonaacetates) include f.p.; optical rotation at a number of wavelengths; C, H and O contents; NMR spectra; suitable TLC conditions; GLC behaviour and derivatization; enzymic detn.; and chemical detn. DIH

57

Non-mutagenicity of saccharin. [Letter]
Pool, B.
Toxicology 11 (1) 95–97 (1978) [10 ref. En] [Inst. of Toxicology & Chemotherapy, German Cancer Res. Cent., Im Nevenheimer Feld 280, 6900 Heidelberg, Federal Republic of Germany]

Relatively pure (< 10 p.p.m. ortho-tolvol-sulphonamide) saccharin was used in a standard plate incorporation assay for mutagenicity (Ames test), using Salmonella typhimurium strains. The saccharin was used at concn. from 62.5–1000 μg/plate, with and without addition of liver S-9 fractions from Aroclor-1254 and phenobarbital pre-treated rats. No mutagenic activity was observed in any case, supporting the view that pure saccharin is not mutagenic. JRR

58

Intensification of fruit-flavors by aspartame.
Baldwin, R. E.; Korschgen, B. M.
Journal of Food Science 44 (3) 938–939 (1979) [En]
[Dep. of Food Sci. & Nutr., Univ. of Missouri-Columbia, Columbia, Missouri 65211, USA]

Orange-, cherry-, and strawberry-flavoured noncarbonated beverages containing 0.065% aspartame were equivalent in sweetness to beverages containing 9.52% sucrose. The same flavours in gelatin desserts sweetened with 15% sucrose were equivalent to those sweetened with 0.070% aspartame. Sensory scores indicated that both orange- and cherry-flavoured beverages had significantly higher intensity of fruit-flavour than their counterparts sweetened with sucrose. However, in strawberry-flavoured beverages or in the 3 flavoured gelatins, no such differences in intensity of fruit-flavours were found between products sweetened with aspartame or sucrose. IFT

59

Canadian food law as it affects the consumer.
Gall, G. L.
Canadian Institute of Food Science and Technology Journal 12 (1) A10–A13 (1979) [En] [Fac. of Law, Univ. of Alberta, Edmonton, Alberta, Canada]

After an outline of the position in Canada regarding the criminal law aspects of food legislation, the author discusses the problem of "over-protection" of the consumer, using the ban on saccharin as an example. He also discusses the problem of reconciling this ban with the current position regarding cigarettes, alcohol and sugar, and concludes that the use of consumerism combined with the need for enforceable legislation are major factors in the high level of government control in the food and related industries. HBr

60

Sweetness and acceptance optimization in cola flavored beverages using combinations of artificial sweeteners – a psychophysical approach.
Moskowitz, H. R.; Wolfe, K.; Beck, C.
Journal of Food Quality 2 (1) 17–26 (1978) [6 ref. En] [MPI Sensory Testing Inc., 770 Lexington Avenue, New York, New York 10021, USA]

This paper develops a quantitative model relating concn. of sweeteners, perceived sweetness, offtaste, and overall acceptability for cola beverages sweetened with artificial sweeteners. The psychological rules of sensory perception that govern reactions to pure aqueous system of sweeteners are shown to hold for complex beverages that are normally drunk. By means of sensory assessments of products, acceptance and rejection limits can be specified both in terms of consumer reactions, and in terms of ingredients, once a model is developed which interrelates these variables. AS

61

HPLC streamlines beverage analyses.
Tweedy, J. D.; Heffelfinger, G. P.; Waldrop, A.
Food Product Development 12 (9) 42–43 (1978) [2 ref. En] [Coca-Cola Co., Atlanta, Georgia, USA]

High pressure liquid chromatography permits the detn. of caffeine, sodium benzoate and saccharin in < 8 min. Octadecyltrichlorosilane chemically bonded to 10 μ silica particles was packed into a 30 cm column with 4 mm inside diam. The fixed wavelength detector was set at 254 nm. Using 20% acetic acid buffered to pH 3.0 with sodium acetate and a flow rate of 2.0 ml/min saccharin was eluted at 1.8 min, caffeine at 4.3 min and sodium benzoate at 7 min. Beverages generally contain other UV-absorbing components that can interfere. 2 examples of such interference cited are: a dietetic cola beverage (containing caramel colour) and a dietetic grape drink containing FD&C Red No. 40 eluting at 6.5 min and interfering with the benzoate peak. An interlaboratory study yielded relative s.d. of 1.0% for caffeine and saccharin analyses and 1.8% for sodium benzoate analysis. VJG

62

[Caries in relation to sugar substitutes.] Karies und Zuckeraustauschstoffe.
Ebell, S.
Ernährungsforschung 23 (6) 171–174 (1978) [42 ref. De] [Sektion Stomatologie, Med. Akad., Erfurt, German Democratic Republic]

Studies on the cariogenic activity of xylitol, fructose, sorbitol, mannitol, Lycasin (a mixture of sugar alcohols prepared by hydrolysis and hydrogenation of potato starch) and 'total sugar' (a product prepared by hydrolysis of wheat, maize and potato starch, 96% comprising α- and β-glucose) are described. Xylitol showed the least cariogenicity; it can be metabolised only slightly by the oral microflora, and pH therefore does not reach the critical level of 5.5. Xylitol is slightly sweeter than sucrose, and is considered to be suitable for caries prophylaxis. The other sugar substitutes were cariogenic, although to a lesser extent than sucrose. IN

63

Psychological correlates of sugar consumption.
Moskowitz, H. R.
Journal of Food Quality 2 (1) 27–40 (1978) [15 ref. En] [MPi Sensory Testing Inc., 770 Lexington Avenue, New York, New York 10021, USA]

This paper reviews some of the research on the sweet taste which has been published during the past several decades. It stresses the division of understanding of sweetness into 3 sections: quality (type of taste, and the role of sweetness), measurement of sweetness intensity or strength of the perception and the correlation with physical measurements, and finally the hedonics of sweetness which represents the affective portion. Data is presented from a real-world study on the sweetness and liking of a beverage which illustrates that although children and adults may perceive the sensory characteristics of sweetness in similar manners, nonetheless their hedonic reactions are quite different to the same sweetened beverage. AS

64

Noncariogenic comestible.
Muhler, J. C.; Kleber, C. J.; Kelly, R. G. (**United States of America,** Indiana University Foundation)
United States Patent 4 134 999 (1979) [En]

Noncariogenic comestibles are described which contain sweetener compositions comprising sorbitol or xylitol (75% by wt.) together with a 2nd component comprising glucose or fructose (60% by wt.). IFT

65

Utilization of the byproducts of sugar industry – preparation of xylitol, a nutritive sweetener from bagasse. (In 'Proceedings of the Fortysecond Annual Convention' [see FSTA (1979) 11 9L571].) [Lecture]
Bose, S.; Gupta, K. C.; Suri, S. K.
pp. G115–G121 (1978) [14 ref. En] [Nat. Sugar Inst., Kanpur, Uttar Pradesh, India]

Powdered, dry bagasse was defatted and delignified with suitable reagents, and then depectinated with ammonium oxalate. The product, when extracted with aqueous alkali and subsequently treated with acid and rectified spirit, yielded a hemi-cellulose from which crude xylan was isolated with Fehling's solution. The copper-xylan complex gave, on decomposition, a xylan which on hydrolysis with acid yielded xylose. Xylose on

reduction with (i) sodium borohydride or (ii) Raney nickel gave xylitol. (i) gave higher yield (1.2 g xylitol from 2 g xylose) of xylitol than (ii) (1.05 g xylitol from 2.5 ml aqueous xylose). CFTRI

66

Use of glucopyranosido-1,6-mannitol as a sugar substitute.
Schiweck, H.; Steinle, G.; Müller, L.; Gau, W.; Munir, M. (Süddeutsche Zucker AG)
United States Patent 4 117 173 (1978) [En]

Foods and beverages are sweetened by the incorporation of glucopyranosido-1,6-mannitol, which is obtained by catalytically hydrogenating neutral aqueous solutions of iso-maltulose and cooling the hydrogenated solution. IFT

67

Artificial sweetener.
Deutsche Gold- & Silber-Scheideanstalt voormals Roessler
British Patent 1 534 957 (1978) [En]

Foods are sweetened without bitter after taste by the incorporation of 2-hydroxy-4-methyl valeric acid or its salts. IFT

68

Determination of food preservatives and saccharin by high-performance liquid chromatography.
Leuenberger, U.; Gauch, R.; Baumgartner, E.
Journal of Chromatography 173 (2) 343–348 (1979) [13 ref. En] [Kantonales Lab., PO Box, CH-3000 Berne 9, Switzerland]

The quantitative analysis of benzoic and sorbic acid, methyl, ethyl and propyl esters of p-hydroxybenzoic acid and saccharin in foodstuffs is described. These compounds are quantitatively extracted with disposable clean-up columns packed with Extrelut and simultaneously determined by high-performance liquid chromatography on reversed-phase columns. Complicated matrices e.g. cheese, yoghurt, cake, ketchup and chocolate were tested and recoveries were generally >95% in the concn. ranges normally used in the food industry. AS

69

[Disaccharide alcohols. A new class of sugar substitutes.] Disaccharidalkohole. Neue Klasse von Zuckeraustauschstoffen.
Schiweck, H.
Süsswaren 22 (14) 13–21 (1978) [40 ref. De] [Zentrallab. der Süddeutschen Zucker-AG, Obrigheim, Federal Republic of Germany]

Structure, production, m.p., solubility, viscosity, sweetness, cariogenicity, hydrolysis characteristics, calorific value, metabolism etc. of disaccharide alcohols are discussed, with special reference to maltitol and maltotriol, lactitol, lycasin (a product manufactured by hydrogenation of glucose syrup), isomaltitol, and glucopyranosido-1,6-mannitol. IN

70

Preparation of D-mannitol.
Towa Kasei Kogyo Co. Ltd.
British Patent 1 539 457 (1979) [En]

A process is described for the conversion of glucose to D-mannitol by the partial epimerization to mannose using a Mo catalyst, followed by hydrogenation. IFT

71

[Method for preparation of isomeroses from bakery waste.] Verfahren zur Herstellung von Isomerose aus Backwarenbruch.
Müller, H. (Chemap AG)
Swiss Patent 609 378 (1979) [De]

Bakery waste containing starch, sugar, protein and fat is extracted with hexane to remove the fat. The starch is hydrolysed, and with the sugar in solution is broken down to glucose with enzymes such as amidoglucosidase; the protein is then separated off. The glucose solution is ultrafiltered and then isomerized with an isomerase. The isomeroses are purified from salts etc. by ion-exchange. W&Co

72

[Use of xylitol, and toxicological considerations.] [Review]
Gatti, G. L.; Salvatore, G.
Rivista della Societa Italiana di Scienza dell'Alimentazione 7 (4) 329–336; (5) 387–394 (1978) [74 ref. It] [Lab. di Tossicologie, Istituto Superiore di Sanita, Rome, Italy]

This review covers the following aspects: metabolism of xylitol; legal status of use of xylitol in foods in various countries; toxicity studies in animals; observations in humans; the present use of xylitol in foods etc. in Italy, and its legal basis; and overall toxicological conclusions. AJDW

73

Negative lifetime carcinogen studies in rats and mice fed 50 000 PPM saccharin. (In 'Chemical toxicology of food' [see FSTA (1979) 11 10C579]) [Lecture]
Homburger, F.
pp. 359–373 (1978) [13 ref. En] [Bio-Res. Consultants Inc., 9 Commercial Avenue, Cambridge, Massachusetts 02141, USA]

Lifetime studies with rats and mice fed 50 000 p.p.m. saccharin showed no excess of tumor incidence over that in control animals. Occasional bladder tumours in treated and untreated animals were ascribed to infestation with Trichosomoides crassicanda. Results throw doubt on the scientific basis for the ban on saccharin in the USA. RM

74

Tangled in the traces.
Farrer, K. T. H.
Food Technology in Australia 30 (8) 312–316 (1978) [19 ref. En] [Kraft Foods Ltd., Box 1673N, Melbourne, Victoria 3001, Australia]

Presence of nitrosamines, Hg, I and saccharin in food is briefly discussed. The problems of the press, the consumer, the regulatory authorities and the manufacturer in coming to terms with the addition to or recognition in food of 'foreign' substances in very small concn. are considered. Tabulated data show advances made in analytical methodology. VJG

75

Soft drinks – an overall view.
Tremberth, M.
International Flavours and Food Additives **10** (2) 67–68 (1979) [En]

Aspects considered are: vodka mixers; low-calorie drinks; artificial sweeteners (saccharin and aspartame); other sweeteners (fructose, high fructose syrups); acidulants (malic acid, lactic acid); nectars; manufacturing trends in bottle size; post-mix drinks; and equipment (including high-speed bottling lines, and on-line methods of measurement). VJG

76

[Acceptability of the sweetness of stevioside used as a natural sweetener.]
Kim, H.-S.; Lee, H.-J.
Korean Journal of Food Science and Technology **11** (1) 56–62 (1979) [10 ref. Ko, en] [Dep. of Food & Nutr., Yonsei Univ., Seoul, South Korea]

The acceptability of purified stevioside as a sweetener was investigated. Yield of stevioside was 7.30–17.8% of dried stevia leaf harvested in Korea; purified stevioside was 100–150 × sweeter than sucrose. Acceptability of purified stervioside was improved by mixing with other sweeteners such as the following: sucrose > glucose > fructose = invert sugars > saccharin-Na. When 2 types of sweetener were mixed with stevioside the improvement was the same as 1 sweetener mixed with stevioside. The mixture of stevioside with NaCl did not have any off taste. [From En summ.] SP

77

[Continuous centrifugation of xylitol massecuite.]
Il'in, M. I.; Danilin, S. V.; Goloborod'ko, Yu. I.; Dakhno, V. I.; Nikolaev, D. I.; Glazman, B. A.; Pashkova, L. N.; Strel'nikov, S. G.
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya No. 1, 114–118 (1979) [3 ref. Ru] [Krasnodarskii Politekh. Inst. Krasnodar, USSR]

The possibility of separating xylitol massecuite in continuous separators, either giving centrifugal removal of sediment slurry, or equipped with conical or blade rotors, was studied. The former are less satisfactory; the latter require less energy owing to a lower factor of separation (1600 for product I massecuite, and 960 for product 2 with blade rotors vs. 2500 for product I in conical rotor separators). STI

78

Use of fructose, sorbitol, or xylitol as a sweetener in diabetes mellitus. [Review]
Brunzell, J. D.
Journal of the American Dietetic Association **73** (5) 499–506 (1978) [87 ref. En] [Dep. of Med., Div. or Metabolism & Endocrinology, Univ. of Washington, Seattle, USA]

Effects of acute and chronic injestion of the nutritive sweeteners in diabetic and non-diabetic individuals are reviewed. Effects of dietary starches on diabetic patients, the effect of refined sugar vs. complex carbohydrates on micronutrient and fibre intake are considered. VJG

79

[Sweetening capacity of saccharin and cyclamate in hot drinks.] Über die Süssungsfähigkeit von Saccharin und Cyclamat in Heissgetränken.
Hoppe, K.; Gassmann, B.
Nahrung **23** (3) 319–325 (1979) [11 ref. De, en ru] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

Studies were conducted on the sweetness of saccharin and cyclamate (in relation to that of sucrose) in tap water at 20°, 30°, 40° and 50°C, and in China tea infusions at 20° and 50°C. Sweetness of a range of cyclamate and saccharin concn. was compared with that of 2 or 4% sucrose solutions at these temp. Tables of results are given. Sweetness of both synthetic sweeteners studied decreased with increasing temp.; to achieve the same relative sweetness in water at 50° as at 20°C, cyclamate concn. must be increased by a factor of 1.3, and saccharin content must be increased by a factor of 2.4. In studies using tea, results for saccharin were similar, whereas the decrease in sweetness of high cyclamate concn. was less in tea then in water. Practical implications for the use of artificial sweeteners in hot drinks are discussed. IN

80

Suppression of the sweetness of 2',3-dihydroxy-4-methoxydihydrochalcone by α-hydroxylation.
Sweeny, J. G.; Iacobucci, G. A.
Journal of Agricultural and Food Chemistry **27** (3) 467–469 (1979) [12 ref. En] [Corporate Res. & Development Dep., The Coca-Cola Co., Atlanta, Georgia 30301, USA]

The sweet taste of the title compound was absent in a synthesized α-hydroxy analogue. The effect of placing a hydrophilic group at a hydrophobic 'elbow' of the molecule is discussed in terms of known structure-activity relationships for sweet compounds. DIH

81

Saccharin – the sweet and sour saga.
Middlekauff, R. D.
Perfumer & Flavorist **4** (1) 23–26, 28 (1979) [En] [Bonner, Thompson, O'Connell & Gaynes, Washington, DC, USA]

This lecture reviews the history of the use and USA legal status of saccharin as a food additive, and its removal in 1972 from the list of "generally recognized as safe" (GRAS) substances by the FDA, the 1977 US Senate Saccharin Study Labelling Act, P.L. 95-203, and the study undertaken by the US National Academy of Sciences. RM

82

Separation of major components in licorice using high-performance liquid chromatography.
Beasley, T. H., Sr.; Ziegler, H. W.; Bell, A. D.
Journal of Chromatography 175 (2) 350–355 (1979) [14 ref. En] [Corporate Analytical Services Lab., Mallinckrodt Inc., PO Box 5439, St. Louis, Missouri 63147, USA]

A method is described for separation of at least 8 major components of licorice extract using a gradient, reversed-phase high-performance liquid chromatography system. The chromatograph had a stainless steel column packed with C18-Corasil (37–50 μm) reversed-phase packing and a precolumn containing Corasil II. Glycyrrhizin, the sweet tasting component of licorice extract, was identified at about 22 min based on the elution time of ammonium glycyrrhizinate. Chromatograms are shown of licorice extracts from Israel, Italy, Afghanistan and Russia. The 4 peaks between 7 and 15 min elution time seem to vary in height depending on country of origin of the licorice, and could be used to identify the source of root or extract. AL

83

Full bodied, firm frozen fruit – the secret is corn sweeteners.
Beery, K. E.
Food Product Development 12 (8) 76 (1978) [En] [ADM Corn Sweeteners, Cedar Rapids, Iowa, USA]

Improved fruit integrity and texture have been attained using 100% corn sweeteners for 'capping' fruit before freezing, instead of using sucrose. Capping is intended to preserve colour and by preventing oxidation, maintain the flavour. ADM Corn Sweeteners has been working with frozen strawberries capped with 100% CornSweet 55 and with the following % combinations of CornSweet 55 and 42 DE corn syrup (70/30, 50/50, 30/70 and 20/80 resp.). Results are tabulated for cost/cwt, savings compared with 100% sucrose, savings/10 million lb and strawberry integrity. In addition to improved fruit quality and a clearer syrup containing fewer fruit fragments, considerable savings can be attained. The greatest saving was obtained with the 20/80 combination of CornSweet 55/corn syrup. Reasons for the improvement in fruit quality are discussed. VJG

84

[Mannitol production.]
Toyo Jozo Co. Ltd.
Japanese Examined Patent 5 401 794 (1979) [Ja]

Mannitol is produced by the fermentation of a medium containing iso-butyric acid as the main C source using a Candida aliphatica microorganism. IFT

85

Sweetening compositions containing protein sweeteners.
Tate & Lyle Ltd.
British Patent 1 523 931 (1978) [En]

Saccharin sweetening compositions are described which contain thaumatin or monellin and a carbohydrate taste modifier, e.g. L-gulose, D-fucose, xylitol, D-arabinol, lactulose, glucoheptose, D(+)-galactose, and its derivative D(+)-galactosamine, or a salt thereof. SP

86

Sweetening compositions containing aldohexuronic acids.
Tate & Lyle Ltd.
British Patent 1 523 932 (1978) [En]

Saccharin sweetening compositions are described which contain thaumatin or monellin and an aldohexuronic acid or a derivative as a taste modifier. IFT

87

Developments in sweeteners. 1. [Book]
Hough, C. A. M.; Parker, K. J.; Vlitos, A. J. (Editors)
xii + 192pp. ISBN 0-85334-820-0 (1979) [many ref. En]
Barking, Essex, UK; Applied Science Publishers Ltd. Price £15.00 [Philip Lyle Memorial Res. Lab., Univ., Whiteknights, Reading, Berks., UK]

This book illustrates the recent developments in sweetener research and contains the following chapters. Sucrose: a royal carbohydrate, by A. Hugill (pp. 1–42, 75 ref.). Recent developments in production and use of glucose and fructose syrups, by C. Bucke (pp. 43–68, 36 ref.). Sweet polyhydric alcohols, by C. A. M. Hough (pp. 69–86, 56 ref.). Protein sweeteners, by J. D. Higginbotham (pp. 87–123, 69 ref.). Peptide-based sweeteners, by R. H. Mazur & A. Ripper (pp. 125–134, 26 ref.). A survey of less common sweeteners, by G. A. Crosby & R. E. Wingard, Jr. (pp. 135–164, 88 ref.). The theory of sweetness, by G. G. Birch & C. K. Lee (pp. 165–186, 49 ref.). A 6-pp. subject index is also included. SP

88

Fruits, flavors and the yoghurt industry.
Grosskopf, J. C.
American Dairy Review 41 (5) 38–39, 51 (1979) [En]

Recent developments in the processing of fruit for flavouring yoghurt are discussed, including the use of high-fructose maize sweeteners, rather than sucrose, to 'cap' fruit prior to freezing with the advantage of improved protection against oxidation, use of vacuum-sealed bag-in-box containers and rapid freezing of the fruit, continuous processing with heating to ≥ 190°F in scraped-surface heat exchangers and aseptic packaging (giving in conjunction with a special 'oxygen barrier' plastics bags a shelf-life of ≥ 1 yr), use of pectin as a stabilizer, and finally various aspects of the quality of fruit supplies. FL

89

Microbial enzymes in the production of nutritive sweeteners from starch.
Weibel, M. K.; McMullen, W. H.; Starace, C. A.
Developments in Industrial Microbiology 19, 103–115 (1978) [21 ref. En] [Novo Lab., Inc., Wilton, Connecticut 06897, USA]

The role of microbial enzymes in the production of nutritive sweeteners from starch is reviewed. The organisms used to produce the enzymes, properties of the enzymes and the processes used to produce the sweeteners are described. Particular attention is given to the recent advances in enzyme technology that led to the manufacture of high fructose syrups, the newest sweetener produced from starch. AS

90

[Thiano-(3,2-d)-isothiazolondioxide, method for its preparation and its use.] Ein thieno (3,2-d) isothiazolondioxid, Verfahren zu seiner Herstellung und dessen Verwendung.
Trummlitz, G.; Seeger, E.; Engel, W. (Dr. Karl Thomae GmbH)
German Federal Republic Patent Application 2 749 640 (1979) [De]

5-Methyl-thiano-(3,2-d)isothiazol-3(2H)-on-1,1-dioxide and its pharmaceutically acceptable salts, e.g. those of Na and Ca, may be used as sweeteners. W&Co

91

Method of making a non-foaming low calorie sweetening composition.
Finucane, T. P.; Earle, E. L.; Dworetzky, A. H. (General Foods Corp.)
United States Patent 4 143 170 (1979) [En]

An improved method is described for producing a readily dispersible, non-foaming, low-calorie bulked sweetener composition comprising a co-dried edible bulking agent, and a low-calorie sweetening composition which contains an effective amount of a defoaming agent. IFT

92

Sweetening agent.
Meiji Seika Co. Ltd.
UK Patent Application 2 001 075A (1979) [En]

Starch hydrolysate compounds for foods are prepared by treating liquified starch with Streptomyces amylase. IFT

93

Health laws and regulations – European Communities.
World Health Organization
International Digest of Health Legislation 29 (2) 330-343 (1978) [En] [Geneva, Switzerland]

A selection of EEC health laws and regulations is presented including the following which relates to food hygiene: Commission Recommendation No. 78/358/EEC of 29 March 1978 to Member States on the use of saccharin as a food ingredient and for sale as such in tablet form to the final consumer. This Recommendation was issued in the light of an endorsement by the Scientific Committee for Food on the temporary ADI (acceptable daily intake) of 0 to 2.5 mg/kg by wt. proposed by the joint FAO/WHO Expert Committee on Food Additives. VJG

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FAB 3

NATURAL AND SYNTHETIC SWEETENERS

SELECTED FROM VOLUME 12
FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Pudoc), Wageningen.

INTRODUCTION

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Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Symposium on present status and goals of collaborative studies on toxicology. [Conference proceedings]
United States of America, Association of Official Analytical Chemists
Journal of the Association of Official Analytical Chemists 62 (4) 832-916 (1979) [many ref. En]

Papers are published that were presented at the symposium held during the 92nd Annual Meeting of the AOAC held in Washington DC, 16-19 Oct., 1978. The papers include Comparison of studies on saccharin and sodium nitrite, by J. M. Taylor & V. H. Morgenroth III (pp. 883-888, 11 ref.). A further paper is abstracted individually [see following abstr.]. DIH

2

Concentrated liquid low calorie sweetener.
Berg, J. H.; Haas, G. J. (General Foods Corp.)
United States Patent 4 153 737 (1979) [En]

Conc. solutions of dipeptide salts in non-aqueous edible carriers give readily soluble refrigerator-stable liquid sweeteners. AS

3

Substituted benzodioxan sweetening compound.
Dick, W. E., Jr.; Hodge, J. E. **(United States of America,** Secretary of Agriculture)
United States Patent 4 146 650 (1979) [En]

Foods are sweetened by the incorporation of specified substituted benzodioxan compounds, 2-(3-hydroxy-4-methoxyphenyl)-1,3-benzodioxan and its salts. IFT

4

Artificial sweetener.
Tate & Lyle Ltd.
British Patent 1 543 167 (1979) [En]

Artificial sweetening compositions are described based upon chlorinated sucrose derivatives which have the sweetening power of saccharin without a bitter aftertaste. IFT

5

[Artificial sweetener.]
Kyowa Hakko Kogyo Co. Ltd.
Japanese Examined Patent 5 408 752 (1979) [Ja]

Process is described for the production of soluble flavonoid glycosides by reacting an amylase enzyme with a mixture of a flavonoid monoglycoside and starch. IFT

6

[Sweetening agents in the food industry.] [Review]
Zaorska, H.
Przemysl Spozywczy 33 (2) 45-50 (1979) [28 ref. Pl, ru, en, fr, de]

Aspects covered in this review include glucose-fructose syrup, isomerose, fructose and non-calorie sweeteners (e.g. aspartame, miraculin). Beet sugar is still considered the most economical sweetening agent in temperate climates. HBr

7

Possible mutagenic activity of saccharin.
Renner, H. W.
Experientia 35 (10) 1364-1365 (1979) [10 ref. En]
[Federal Res. Cent. for Nutr., Inst. of Biochem., Engesser Strasse 20, D-7500 Karlsruhe, Federal Republic of Germany]

A mutagenic effect of saccharin in Chinese hamsters, using the in vivo sister chromatid exchange test, was observed when massive overdoses were administered; cyclamate was not mutagenic. AS

8

[National Food Administration Ordinance on alterations to the 1975 Ordinance on food Additives.]
Sweden, Statens Livsmedelsverk
Statens Livsmedelsverks Författningssamling **SLV FS 1979:5,** 6pp. (1979) [Sv]

Alterations to Ordinance **FS 1978:11** [see FSTA (1976) 8 8U517] are listed, covering labelling of foods containing artificial sweeteners or smoke extracts, and use of the artificial sweeteners saccharin and cyclamate in foods. A list is given of foods covered by restrictions on or prohibition of the use of artifical sweeteners, or for which max. permitted sweetener levels have been reduced. AJDW

9

Health laws and regulations - United States of America.
World Health Organization
International Digest of Health Legislation 29 (3) 648-686 (1978) [En] [Geneva, Switzerland]

A selection of USA health laws and regulations is presented including the following which relate to food hygiene: Part 318 of Subchapter A of Chapter III of Title 7 (Agriculture) of the US Code of Federal Regulations (dated 31 Aug. 1977) establishes the requirement that all cooked beef roast be cooked to a min. internal temp. of 145°F so as to destroy Salmonella food poisoning organisms; An Act (Public Law 95-190) amends section 2 of the Safe Drinking Water Act (Public Law 93-523) to extend and increase authorizations provided for public water systems (dated 16 Nov. 1977); An Act (Public Law 95-203) (i) to require studies concerning carcinogenic and other toxic substances in food, the regulation of such food, the impurities in and toxicity of saccharin, and the health benefits, if any, resulting from the use of non-nutritive sweeteners, (ii) to prohibit for 18 months the Secretary of Health, Education and Welfare from taking certain action restricting the continued use of saccharin as a food, drug and cosmetic, and (iii) to require certain labels and notices for foods containing saccharin; and FDA document (dated 1 Dec. 1977) Aflatoxin contamination of milk. This document announces the establishment of an action level of 0.5 parts/billion for aflatoxin contamination of fluid milk products. VJG

10

Health laws and regulations - United States of America.
World Health Organization
International Digest of Health Legislation 29 (4) 823-852 (1978) [En] [Geneva, Switzerland]

A selection of USA health laws and regulations is presented including the following which relate to food hygiene: Part 101 (Food labelling) of Subchapter B of Chapter 1 of Title 21 (Food & Drugs) of the United States Code of Federal Regulations (dated 28 Feb. 1978), establishes a new regulation prescribing the form, text, and manner of display of the notices required by the Saccharin Study and Labeling Act to be displayed in retail establishments that sell food that contains saccharin; Part 131 (Milk and Cream) of Subchapter B of Chapter 1 of Title 21 (Food and Drugs) of the United States Code of Federal Regulations (dated 11 May 1978) establishes standards of identity for evaporated skimmed milk and sweetened condensed skimmed milk and revises the standards of identity for evaporated milk and sweetened condensed milk; and Part 318 (Entry into Official Establishments Reinspection and Preparation of Products) and Part 320 (Records, Registration and Reports) of Subchapter A of Chapter III of Title 9 (Animals and Animal Products) of the United States Code of Federal Regulations (dated 6 July 1978) amends the Federal Meat Inspection Regulations to permit alternative cooking procedures for cooked beef and roast beef. VJG

11

Ammoniated glycyrrhizin; proposed affirmation of GRAS status as direct human food ingredient with specific limitations; amendment.
United States of America, Food & Drug Administration
Federal Register **44** (95, May 15) 28334–28335 (1979) [En] [Washington, DC, USA]

Ammonium glycyrrhizin has recently been used as a sweetener, synergist for sucrose and flavour enhancer for non-liquorice-flavoured foods. Levels of use are too low to produce a distinct liquorice flavour, but are not self limiting. It is emphasized that the original proposal to affirm the generally recognized as safe [GRAS] status was intended to apply only to historical uses as a flavour agent and as a surface-active agent in non-alcoholic beverages. CAS

12

[Reduction in manufacturing use of sugar in the food industry according to the principles of correct nutrition.]
Vacova, T.
Prumysl Potravin **30** (2) 76–79 (1979) [Sk] Vyskumny Ustav Potravinarsky, Bratislava, Czechoslovakia]

Means of reducing the manufacturing use of sugar in Czechoslovakia are considered against the background of recommended reduction of daily calorie intake from 3180 to 2780 kcal per caput and of annual sugar consumption from 35 to 28 kg per caput. Use of replacement sweeteners (saccharin, cyclamates, fructose syrup, xylitol, xylose and aspartame) are discussed from the viewpoints of usefulness and of production of production prospects in Czechoslovakia. Problems arising from changes in physical properties (e.g. f.p. of sweetened beverages), preservation capacity or bulk of foods caused by replacement of sucrose by substitutes are outlined and solutions are suggested with particular attention to the preserving value of xylitol and use of carboxymethylcellulose as a filler. SKK

13

[Sugar flavour enhancement.]
Sanyo Kokusaku Pulp Co. Ltd.
Japanese Examined Patent 5 414 177 (1979) [Ja]

The flavour of sweeteners is enhanced by incorporation of a stevioside extract. IFT

14

Sweetener mixture.
Rymon Lipinski, G.-W. von (Hoechst AG)
United States Patent 4 158 068 (1979) [En]

A sweetener mixture having an improved sucrose-like taste consists of acetosulphame and ≥1 sweetener selected from aspartyl peptide esters, and sulphamate, sulphimide and dihydrochalcone sweeteners. HBr

15

Process of manufacturing dragees.
Mader, H.; Hopfgartner, S. (J. Pfrimmer & Co.; Arcana Chemisch-Pharmazeutische Fabrik GmbH)
United States Patent 4 146 653 (1979) [En]

A dense dragee surface layer is provided by coating the dragee at 85–90°C with a melt of xylitol and sorbito in a weight ratio of 9:1 to 1:1. AS

16

[Invert sugar sweetener.]
Ogura, J.
Japanese Examined Patent 5 412 541 (1979) [Ja]

A sweetening agent containing invert sugar is produced by heating an aqueous sugar solution containing sodium ultraphosphonate. IFT

17

[Considerations of the potential for application of hydrocolloids in the bakery products industry.]
Gedanken zu Möglichkeiten des Einsatzes von Hydrokolloiden in der Backwarenindustrie.
Pulz, O.
Bäcker und Konditor **27** (3) 90 (1979) [5 ref. De] [Inst. für Getreideverarbeitung, Bergholz-Rehbrücke, German Democratic Republic]

The main hydrocolloids obtained from land plants (pectins, arabinogalactan) used in food technology are discussed with reference to their sources, structure, main characteristics and applications. The most important characteristic of pectin (apart from its viscosity) is gel formation, which is influenced by degree of esterification, pH, and presence of cations. Applications include use in jellies, or calorie-reduced products, and stabilization of soft ice cream, foam masses, and 'cream'-type products. Arabinogalactans, which are mainly extracted from larch wood, have body, swelling, etc. characteristics similar to those of sugar in aqueous solutions, and may be of use as sugar substitutes. IN

18

Hydrolysed cereal products.
Lyckeby Starkeiseforadling AB
UK Patent Application 2 007 960A (1979) [En]

Process is described for the enzymic hydrolysis of whole grain, such as wheat, which employs an endopeptidase and an amylase. The bran fraction and water are removed to yield a liquid concentrate product; this can be added as a sweetening agent in foods such as bread, drinks and cereal products. The bran fraction can be used in bread as a fibre additive. SP

19

Saccharin metabolism and tumorigenicity.
Sweatman, T. W.; Renwick, A. G.
Science, USA 205 (4410) 1019–1020 (1979) [11 ref. En] [Clinical Pharmacology Group, Univ. of Southampton, Southampton SO9 3TU, UK]

Exposure of male Charles River CDI rats to a 5% saccharin diet in utero and throughout weaning, conditions associated with tumour induction, did not induce detectable metabolism (<0.4% of oral dose) of tritiated saccharin in vivo. No metabolites (<0.06 μg/kg in 24 h) were detected in the urine of normal rats given a tracer dose. Pretreatment with 3-methyl-cholanthrene did not induce saccharin metabolism. AS

20

Comparative metabolism of aspartame in experimental animals and humans.
Ranney, R. E.; Oppermann, J. A.; Muldoon, E.; McMahon, F. C.
Journal of Toxicology and Environmental Health 2 (2) 441–451 (1976) [10 ref. En] [Dep. of Drug Metabolism & Radiochem., Searle Lab., Skokie, Illinois, USA]

21

Aspartame – A sweet surprise.
Mazur, R. H.
Journal of Toxicology and Environmental Health 2 (2) 243–249 (1976) [6 ref. En] [Chem. Res., G. D. Searle & Co., Skokie, Illinois, USA]

The dipeptide ester L-aspartyl-L-phenylalanine methyl ester (APM) has been found to have a remarkably clean, sucrose-like taste with no off flavour and a potency 150–200× sucrose. Subsequent work has shown that many α-amides of L-aspartic acid are sweet. Some results of stability studies and a taste panel evaluation of APM are reported. AS

22

Hypothalamic morphology following ingestion of aspartame or MSG in the neonatal rodent and primate: A preliminary report.
Reynolds, W. A.; Butler, V.; Lemkey-Johnston, N.
Journal of Toxicology and Environmental Health 2 (2) 471–480 (1976) [9 ref. En] [Dep. of Anatomy, Univ. of Illinois Coll. of Med., Chicago, Illinois, USA]

Neonatal mice received oral doses of monosodium glutamate (MSG) or aspartame. Hypothalamic lesions were encountered at dose levels ≥0.5 g/kg (MSG) and 1.0 g/kg (aspartame). Aspartame administration resulted in a much smaller hypothalamic lesion than did equal dosages of MSG. Infant monkeys received MSG (1–4 g/kg) or aspartame (2 g/kg) by stomach tube. Hypothalamic morphology remained normal at both the microscopic and ultrastructural level. AS

23

Use of aspartame in phenylketonuric heterozygous adults.
Koch, R.; Shaw, K. N. F.; Williamson, M.; Haber, M.
Journal of Toxicology and Environmental Health 2 (2) 453–457 (1976) [En] [Univ. of S. California School of Med., Los Angeles, California, USA]

Aspartame, a new artificial sweetener, was administered to 45 obligate phenylketonuric adults for 28 wk. This new sweetening agent was well tolerated, and no untoward medical or biochemical changes were noted. AS

24

Results of loading doses of aspartame by two phenylketonuric (PKU) children compared with two normal children.
Koch, R.; Schaeffler, G.; Shaw, K. N. F.
Journal of Toxicology and Environmental Health 2 (2) 459–469 (1976) [En] [Dep. of Pediatrics, Univ. of Southern California, School of Med., Los Angeles, California, USA]

Separate tolerance tests with aspartame at 34 mg/kg-day and phenylalanine at 19 mg/kg-day were compared. The results reveal that slight serum elevation of phenylalanine and tyrosine occurred in the 2 PKU and the normal healthy adolescents. It would appear that the phenylalanine in the sweetener aspartame is small enough to be of little clinical significance. AS

25

Use of aspartame by apparently healthy children and adolescents.
Frey, G. H.
Journal of Toxicology and Environmental Health 2 (2) 401–415 (1976) [En] [Health Care Div., Johnson & Johnson, New Brunswick, New Jersey, USA]

This study was conducted to determine the effects and the differences, if any, resulting from the ingestion of aspartame (sweetener) vs. sucrose. A 13-wk, double-blind study was conducted using 126 apparently healthy children and adolescents as panelists. Clinically significant differences in laboratory parameters measured could not be demonstrated; all mean values were within normal limits. No unusual findings were observed in phenylalanine or tyrosine levels. All phenylpyruvic acid and methanol detn. were negative. No important physical changes occurred, and no product-related side effects were reported. AS

26

Effects of aspartame in young persons during weight reduction.

Knopp, R. H.; Brandt, K.; Arky, R. A.
Journal of Toxicology and Environmental Health 2 (2) 417–428 (1976) [15 ref. En] [Dep. of Med., Harvard Med. School, Boston, Massachusetts, USA]

A toxicity study of chronic aspartame ingestion was conducted. Particular attention was given to possible long-term effects of aspartame on the fuel hormonal alterations characteristically caused by wt. reduction. The aspartame dose was 2.7 g/day and was compared on a double-blind randomized basis with a lactose placebo. No meaningful effect of wt. reduction or aspartame was seen on plasma triglyceride and cholesterol, nor on any other parameter of haematologic, hepatic, or renal function that was measured. Similarly, side effects were equally distributed between aspartame and placebo. SP

27

Administration of aspartame in non-insulin-dependent diabetics.
Stern, S. B.; Bleicher, S. J.; Flores, A.; Gombos, G.; Recitas, D.; Shu, J.
Journal of Toxicology and Environmental Health 2 (2) 429–439 (1976) [En] [Dep. of Med., Tulane Univ. School of Med., New Orleans, Louisiana, USA]

Effect of the consumption of the nutritive sweetener aspartame on non-insulin-dependent diabetics was studied. 43 adult diabetics between the ages of 21 and 70 completed a 90-day study; participants were instructed to continue their usual diet and to take 2 capsules of an assigned preparation 3 × daily with meals, either the aspartame (1.8 g) or the placebo. Throughout the study, subjects were examined for symptoms of intolerance, fasting plasma phenylalanine levels >4 mg/100 ml, and deterioration of diabetic control. At the conclusion of the study, subjects exhibited no symptoms that could be traced to the administration of aspartame or the placebo, and diabetic control was unaffected by the chronic administration of these substances. AS

28

Artificial sweetener.
K. Thomae GmbH
UK Patent Application 2 007 227A (1979) [En]

Artificial sweeteners are described which lack the bitter aftertaste of cyclamates or saccharin, and comprise furo and thieno(3,2-d)-isothiazole-3-one-1,1 dioxides. IFT

29

[Artificial sweetener.]
Kyowa Fermentation Co. Ltd.
Japanese Examined Patent 5 413 498 (1979) [Ja]

Sweetening compositions are described free from bitter taste which comprise mixtures of stevioside or glycyrrhizin with peptides and/or amino acids. IFT

30

[Synthetic sweetener.]
Sanyo Kokusaku Pulp Co. Ltd.
Japanese Examined Patent 5 414 178 (1979) [Ja]

The flavour of synthetic sweetener compositions is improved by the incorporation of the mother liquor obtained by the precipitation and separation of stevioside. IFT

31

High pressure liquid chromatographic determination of sodium saccharin, sodium benzoate, and caffeine in soda beverages: collaborative study.
Woodward, B. B.; Heffelfinger, G. P.; Ruggles, D. I.
Journal of the Association of Official Analytical Chemists 62 (5) 1011–1019 (1979) [2 ref. En] [Florida Dep. of Agric. & Consumer Services, Div. of Chem., Tallahassee, Florida 32304, USA]

A collaborative study for detn. of sodium saccharin, sodium benzoate, and caffeine in 3 types of soda beverage (cola, grape, and lemon-lime) was completed using reverse phase HPLC with a μC18 column and acetic acid mobile phase. Recoveries for sodium saccharin were 98.6, 98.0, and 99.1%; for sodium benzoate, 100.6, 102.6, and 100.6%; and for caffeine, 100.8, 101.4, and 101.1%, for the 3 beverages, resp. The method has been adopted as official 1st action. AS

32

Sugars and nutritive sweeteners in processed foods.
United States of America, Institute of Food Technologists
Food Technology 33 (5) 101–105 (1979) [18 ref. En]

Brief descriptions of the natural occurrence and use in foods of several sugars, syrups and sugar alcohols are given, reasons for addition of sugars and nutritive sweeteners to foods considered, and the current opinion of the nutritional role of these substances is summarized. DIH

33

Taste of components of stevioside.
Yoshikawa, S.; Ishima, T.; Katayama, O.
Abstracts of Papers, American Chemical Society 177 (1) AGFD 74 (1979) [En] [NFRI Tokyo, 135, Japan]

Stevioside is the main constituent of the leaves of a Paraguayan wild herb. In addition to the main stevioside, 3 other diterpene glycosides were isolated from the crude glycoside mixture of *Stevia rebaudiana*. To examine stevioside and other newly found diterpene glycoside as sweeteners, sensory tests were conducted with a trained panel. Bitterness, astringency, aftertaste and general acceptability were evaluated by scoring method. To determine sweetness intensity of 4 glycosides, 11 concn. of sucrose solution were prepared in ascending order as a sweetness intensity scale. Sweetness of various concn. of glycosides was measured on the sucrose scale. Stevioside has slight bitterness, some astrigency, aftertaste and showed fairly low general acceptability among the 4 diterpene glycosides. Stevioside was 240 × sweeter than 2% sucrose and 128 times sweeter than 6% sucrose in aqueous solution. Rebaudioside A showed the lowest bitterness and astringency, and highest acceptability and compared favourably with sucrose in those sensory attributes. Rebaudioside A was 20 and 30% sweeter than stevioside at 2 and 6% sucrose level, resp. Dulcosides A and B do not differ in taste intensity and they were 54 and 36 times sweeter than 0.7 and 2.0% sucrose level, resp., and differ little from stevioside in the descriptive taste analysis. AS

34

Bitter taste of saccharin related to the genetic ability to taste the bitter substance 6-n-propylthiouracil.
Bartoshuk, L. M.
Science, USA **205** (4409) 934–935 (1979) [24 ref. En] [John B. Pierce Foundation Lab., Yale Univ., New Haven, Connecticut 06519, USA]

Bitter taste thresholds for 6-n-propylthiouracil are bimodally distributed, dividing subjects into tasters and nontasters. Their taste worlds differ with regard to the sweetness of sucrose and saccharin and to the bitterness of saccharin. These differences suggest that nontasters tend to perceive less bitterness in saccharin at concn. used in beverages. AS

35

International activities in the field of food additives, with particular reference to carcinogenicity.
Lu, F. C.
Ecotoxicology and Environmental Safety **4** (2) 301–309 (1979) [21 ref. En] [Food Additives Unit, WHO, Geneva, Switzerland]

The United States Food and Drug Administration has restricted and suspended the use of a number of food additives e.g. cyclamates, amaranth and saccharin, which had been generally recognised as safe, but were then reported to be carcinogenic to experimental animals. A brief review is given of the events leading up to these decisions, an outline of the 'Regulations' in certain major countries, as well as the recommendations of the WHO/FAO Expert Committee on Food Additives. VJG

36

A history of sweeteners-natural and synthetic.
Inglett, G. E.
Journal of Toxicology and Environmental Health **2** (2) 207–214 (1976) [26 ref. En] [N. Res. Lab., ARS, Peoria, Illinois, USA]

The history of sweeteners is reviewed, covering sweet berries, honey, sucrose, starch-derived sugars and synthetic sweeteners. Unusual sources of sweet taste are discussed including: miracle fruit *(Synsepalum dulcificum)* which possesses a taste-modifying substance that causes sour foods to taste sweet, the active principle of which is a glycoprotein; *Dioscoreophyllum cumminsii*, the serendipity berry, contains an intense sweetener which is a protein; and *Thaumatococcus daniellii*, katemfe, which contains 2 proteins having intense sweetness. It is concluded that as intensely sweet protein sweeteners act directly on taste buds as a probe, a peptide linkage analogous to the aspartic acid sweeteners may be partly responsible for their sweetness. SP

37

Effect of ammoniated glycyrrhizin on the mineral utilization of rats.
West, L. G.; Nonnamaker, B. J.; Greger, J. L.
Journal of Food Science **44** (5) 1558–1559 (1979) [13 ref. En] [Dep. of Foods & Nutr., Purdue Univ., W. Lafayette, Indiana 47907, USA]

Administration of ammoniated glycyrrhizin, widely used in foods as a sweetener and foam stabilizer, for 14 days in the diets of rats at a 2% level caused a significant increase in Fe excretion and a significant depletion in liver Fe stores as compared to pairfed control rats. Zn and Mg levels were not significantly influenced by this dietary saponin. Body and faecal wt. were also significantly increased in animals consuming the saponin-containing diet. It is suggested that the saponin could adversely affect human Fe status. DIH

38

[Determination of saccharin in non-alcoholic beverages by differential pulse polarography.]
Bestimmung von Saccharine in nichtalkoholischen Getränken durch Differential-Pulspolarographie.
Sontag, G.; Kral, K.
Zeitschrift für Analytische Chemie **294** (4) 278–283 (1979) [14 ref. De, en] [Inst. für Analytische Chem. der Univ. Wien, Währingerstrasse 38, A-1090 Vienna, Austria]

A method is reported for detn. of saccharin in soft drinks, tonic waters, fruit juices and sweeteners by differential pulse polarography. Saccharin is reduced at a dropping Hg electrode and determined at pH 1 (H_2SO_4, detection limit 0.5 p.p.m.) or pH 8.5 (Britton-Robinson buffer, detection limit 1 p.p.m.). The mechanism was elucidated by electrolysis at a controlled potential. The course of electrolysis was monitored by HPLC. Reaction products isolated were identified by IR and NMR spectroscopy and by elemental C, H, N analysis. As direct detn. is inhibited by oxalate, acetate, proteins and surfactants, prior extraction of saccharin is necessary. Amounts determined in various fruit juices and beverages were 96–162 p.p.m. in brine from gherkins 22 p.p.m. and in liquid natreen 10 400. RM

39

Sugar free chewing gum.
Petri's Eftf. I/S
UK Patent Application **2 013 474A** (1979) [En]

Sugar-free chewing gum is sweetened by incorporation of a sorbitol syrup containing a sugar acid (gluconic, heptagluconic, glucuronic or galacturonic acids) to control crystallization. IFT

40

[Sweeteners for low-calorie drinks.] Süsstoffe für kalorienarme Getränke.
Kadach, P.
Erfrischungsgetränk **31** (49) 995–998, 1000 (1978) [19 ref. De]

The chemical preparation of saccharin and cyclamate is described. The 2 methods described for saccharin commence with toluene and with naphthalene, resp., and the syntheses are illustrated with structure drawings and photographs of space-filling models of the intermediate and final products. Other substances briefly discussed are dulcin [ethoxyphenyl urea], suosan [N-(p-nitrophenyl)- N'-(β-carboxyethyl)-urea sodium salt], Neo-douxan [1-ethoxy-2-amino-4-nitrobenzene] and ultrasüss [1-propoxy-2-amino-4-nitrobenzene]. JRR

41

Possible use of dietary surveys to assess intake of food additives.
Disselduff, M. M.; Try, G. P.; Berry, W. T. C.
Food and Cosmetics Toxicology 17 (4) 391–396 (1979) [7 ref. En] [Dep. of Health & Social Security, Alexander Fleming House, London SEI, UK]

A study was made from Sept. 1970 to Aug. 1971, of school children aged 14–15 yr, who were randomly selected from all schools in the SE area of the City of Birmingham. Trained dietary observers supervised the completion of a weighed record of all food and drink ingested over a period of 7 consecutive days. The information obtained was used to assess the intakes of 3 food additives: (i) sorbic acid, (ii) saccharin and (iii) benzoic acid. Methodological problems common to the assessment of any additive used in food are dealt with. Soft drinks accounted for >50% of the intake of (iii) and for about 75% of (ii) intake, while cakes, biscuits and pastries accounted for >80% of (i) intake. VJG

42

Quantitative determination of glycyrrhizic acid in liquorice roots and extracts by TLC-densitometry.
Takino, Y.; Koshioka, M.; Shiokawa, M.; Ishii, Y.; Maruyama, S.; Higashino, M.; Hayashi, T.
Planta Medica 36 (1) 74–78 (1979) [13 ref. En] [Shizuoka Coll. of Pharmacy, 2-1 Oshika-2-Chome, Shizuoka-shi, Shizuoka 422, Japan]

43

High-performance liquid chromatographic determination of impurities in commercial saccharin.
Szokolay, A. M.
Journal of Chromatography 187 (1) 249–254 (1980) [17 ref. En] [Schweppes R&D Lab., London NW9 6AN, UK]

Most commercial saccharin is manufactured by the Remsen-Fahlberg method which oxidizes toluene 2-sulphonamide (*o*TS) to saccharin. Food-grade saccharin therefore often contains various amounts of *o*TS as an impurity, as well as 4-sulphamoylbenzoic acid (*p*SBA), which is the oxidation product of toluene 4-sulphonamide (*p*TS). A reversed-phase HPLC method is described which is able to separate both acid and amide isomers, and after the removal of saccharin offers the basis of quantitative analysis. Optimal HPLC separation of *o*TS and other impurities from saccharin was achieved using a 25 cm × 4.6 mm Zorbax CN column, flow rate 1.7 ml/min, and UV detection at 268 nm; 4-hydroxybenzoic acid was used as internal standard. The recovery range was 96–110% for *o*TS and 92–110% for *p*SBA. A number of commercial saccharin samples from various sources were analysed and some results are summarized. Typical HPLC chromatograms of a methylene chloride and of a methanolic extract are given. AL

44

The saccharin question re-examined: an A.D.A. statement.
United States of America, American Dietetic Association
Journal of the American Dietetic Association 74 (5) 574–581 (1979) [67 ref. En]

Aspects of the topic reconsidered are: the regulatory processes applied to foods; available information on the use of saccharin in foods and beverages; the benefits and risks of this use; and alternative non-nutritive sweeteners (cyclamate, aspartame, neohesperidin dihydrochalcone, miraculin, monellin, thaumatin I and II), and nutritive sweeteners other than sucrose (xylitol, sorbitol, and fructose). After a re-examination of the saccharin question the American Dietetic Society concludes that it supports the continuing research on the dietary uses of saccharin and other artificial sweeteners; supports the need for a systematic review of the Federal Food, Drug & Cosmetic Act; supports the charge of regulatory agencies with responsibility for protecting the public food supply and encourages public participation in the process; and affirms the registered dietitians responsibility to provide guidance to patients, clients, colleagues and the public in selecting foods and establishing dietary patterns. VJG

45

Synthesis and taste of some analogs of stevioside.
Kamiya, S.; Konishi, F.; Esaki, S.
Agricultural and Biological Chemistry 43 (9) 1863–1867 (1979) [24 ref. En] [Food Chem. Lab., Shizuoka Women's Univ. Yata, 409, Shizuoka City, Japan]

Some analogs of stevioside (i), a sweet diterpene glycoside, were synthesized. Coupling of hepta-*O*-acetylsteviolbioside with hexa-*O*-acetyl-2-*O*-α-L-rhamnopyranosyl-α-D-glucopyranosyl bromide, hexa-*O*-acetyl-2-*O*-α-L-rhamnopyranosyl-α-D-galactopyranosyl bromide and hexa-*O*-acetyl-2-*O*-α-L-quinovopyranosyl α-D-galactopyranosyl bromide, in the presence of silver carbonate-celite in dichloroethane followed by deacetylation yielded steviol-13-*O*-β-sophoroside-19-*O*-(2-*O*-α-L-rhamnopyranosyl- β-D-glucopyranosylester) (ii), steviol-13-*O*-β-sophoroside-19-*O*-(2-*O*-α-L-rhamnopyranosyl-β-D-galactopyranosylester) (iii) and steviol-13-*O*-β-sophoroside-19-*O*-(2-*O*-α-L-quinovopyranosyl-β-glucopyranosylester) (iv), resp. Methylation of steviolbioside heptaacetate followed by deacetylation yielded steviolbioside-19-*O*-methylester (v). Reduction of stevioside and (v) with hydrogen gave dihydrostevioside (vi) and dihydrosteviolbioside-19-*O*-methylester (vii). The relative sweetness of (i), (ii), (iii), (iv), steviolbioside, (v), dihydrosteviolbioside, (vi) and (vii) as expected by the percentage of that of sucrose was 210, 300, 300, 230, 90, 90, 6, 30, and 3, resp. AS

46

Flavourings and sweeteners in foods. [Lecture]
Forss, D. A.
Food Technology in New Zealand 13 (4) 3, 5, 7–8, 10 (1978) [21 ref. En] [Min. of Agric. & Fisheries, Invermay Agric. Res. Cent., Mosgiel, New Zealand]

The use of sweeteners in foods is generally discussed, with particular reference to the controversy over the safety of saccharin as a food sweetener; non-nutritive sweeteners such as aspartame (L-aspartyl-L-phenylalanine methyl ester), miraculin (an extract of miracle berry, *Synsepalum dulcificum*) and monellin (an

extract of serendipity berry, *Dioscoreophyllum cumminsii*); and nutritive sweeteners of which the most important is scurose. The safety and regulatory aspects of the use of each category is briefly discussed. JRR

47

Syntheses of saccharin monomers.
Yamamoto, S.; Nanasawa, M.; Kamogawa, H.
Abstracts of Papers, American Chemical Society **177** (2) ORGN 474 (1979) [En] [Dep. of Applied Chem., Yamanashi Univ., Kofu, Japan 400]

It is suggested that potential toxic effects of food additives such as sweeteners could be avoided by covalently binding them to polymers, rendering them nonabsorbable. As a first step in this direction, synthesis routes are presented for vinyl monomers containing a saccharin unit (saccharin monomers). A key reactive intermediate is produced from *p*-nitrotoluene by introduction of an *o*-SO_2Cl group, substitution of -NH_2 for Cl, cyclization in chromic acid to give -CO-NH-SO_2- and reduction of the nitro group to NH_2. Several possible subsequent reactions of the intermediate are presented. DIH

48

Increased thermal stability of proteins in the presence of sugars and polyols.
Back, J. F.; Oakenfull, D.; Smith, M. B.
Biochemistry **18** (23) 5191–5196 (1979) [37 ref. En] [CSIRO Div. of Food Res., Food Res. Lab., North Ryde, NSW 2113, Australia]

Sugars and polyols stabilize proteins against heat denaturation. Scanning calorimetry was used to obtain a quantitative estimate of the degree of stabilization. Solutions of ovalbumin, lysozyme, conalbumin, and α-chymotrypsinogen were heated at a constant rate, and the temp. of the max. rate of denaturation was estimated (T_m). Addition of a sugar or polyol raised T_m. The magnitude of the stabilizing effect (ΔT_m) depended on both the nature of the protein and the nature of the sugar or polyol, ranging from 18.5°C for lysozyme at pH 3 in the presence of 50% (w/w) sorbitol to 0°C for conalbumin at pH 7 in 50% glycerol solution. It is argued that this stabilization is due to the effects of sugars and polyols on hydrophobic interactions. The strength of the hydrophobic interaction was measured in model systems in sucrose and glycerol solutions. Sucrose and glycerol strengthened the pairwise hydrophobic interaction between hydrophobic groups; however, they reduced the tendency for complete transfer of hydrophobic groups from an aqueous to a nonpolar environment. The extent of stabilization by different sugars and polyols is explained by their different influences on the structure of water. The difference between the partial molar vol. of the sugar of polyol and its van der Waals vol. was used as a rough quantitative measure of the structure-making or structure-breaking effect. There was a linear relationship between this quantity and ΔTn_m. AS

49

[The relationship between viscosity and 'body' of non-alcoholic beverages.] Zur Frage einer Wechselbeziehung von Viskosität und Vollmundigkeit in alkoholfreien Erfrischungsgetränken.
Gassmann, B.; Hoppe, K.; Kurth, U.
Nahrung **23** (7) 765–769 (1979) [6 ref. De, en, ru] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

Substitution of artificial sweeteners for sucrose reduces both viscosity and subjectively-evaluated 'body' of soft drinks. To test a hypothesis that subjectively-evaluated 'body' is dependent on the viscosity of the sample, comparative trials were conducted on a sugar-free soft drink, sweetened with cyclamate + saccharin, and containing various levels of carbohydrate preparations. The carbohydrates tested were: starch syrup, d.e. 38–42; Driosan (an acid-hydrolysed potato starch derived product) d.e. 25–30; SHP-2 (a laboratory-prepared enzymic hydrolysate of starch) d.e. 15–20; Serogel L 90 (a carboxymethylcellulose preparation); and Polydextrose type A, a glucose polymer with a max. of 4% free glucose. Soft drinks, prepared to have equal sweetness, containing these carbohydrate products were compared with a reference series of samples with sucrose concn. over the range 0–70 g/l, viscosity and 'body' being evaluated. A table of results is given. The results show that viscosity increases with increasing concn. of each of the carbohydrates studied. 'Body' increased with increasing starch syrup concn.; no such relationship was observable for the other carbohydrates except Serogel L 90 (which was tested at only 2 concn.). Viscosity and 'body' were not significantly correlated. IN

50

[Isoglucose, a new food-grade sweetener.]
Amato, P.
Industrie Alimentari **18** (9) 635–637 (1979) [13 ref. It] [Istituto di Merceologia, Univ. di Napoli, Naples, Italy]

51

[Mannitol as a sugar substitute.] Manit als Zuckeraustauschstoff.
Sodemann, K.
Ernährungsforschung **24** (3) 69–70 (1979) [9 ref. De] [Zentralinst. für Diabetes, "Gerhardt Katsch", Karlsburg, German Democratic Republic]

Mannitol is a highly soluble sugar alcohol, with a sweetness approx. 50% that of sucrose. Consumption of mannitol does not increase blood glucose level, does not stimulate glucose secretion and has no effect on serum free fatty acid, lactate, pyruvate or urea concn. It is, therefore, preferable to fructose, xylitol or sorbitol as a sugar substitute in foods for diabetics. Its main disadvantage is laxative activity. The daily intake should be restricted to 20 g; combination with xylitol or sorbitol should be avoided, because of the possibility of potentiation of effects. IN

52

Cost alternatives in sweeteners.
Lagrange, B.
American Dairy Review 41 (11) 40A–40B (1979) [En]
[Iowa State Univ., Ames, Iowa 50010, USA]

Costs are given of 5 types of sweeteners (different combinations of sucrose, high-fructose corn syrups and corn syrups) used in ice cream manufacture in comparison to sucrose. A sweetener comprising 50% of 36 DE corn syrup and 50% high-fructose corn syrup appears to be the cheapest. FL

53

In the 1980's – nonabsorbable polymer-leashed additives.
Anon.
Food Processing 40 (1) 22–25 (1979) [En]

The status of research into the production and potential of polymer-leashed additives, which are not absorbed during human digestion, is discussed. Research has been carried out by Dynapol (Palo Alto, California, USA) into methods of linking additives such as colouring and antioxidant agents to polymer molecules so as to render them biologically inactive. Another field in which the technique may be useful is that of non-nutritive sweeteners. Progress in the development of synthetic dihydrochalcone compounds and analogues with sweetening abilities is described. JRR

54

Absence of mutagenic activity in *Salmonella typhimurium* of some impurities found in saccharin.
Poncelet, F.; Roberfroid, M.; Mercier, M.
Food and Cosmetics Toxicology 17 (3) 229–231 (1979) [8 ref. En] [Lab. of Biotoxicol., Univ. of Louvain, School of Pharm., U.C.L.-73.69, B:1200 Brussels, Belgium]

Commercial saccharin preparations have been shown to contain compounds responsible for the induction of mutations in *Salmonella typhimurium* strains. The ortho forms of the most frequent impurities present in commercial saccharin (sulphobenzoic acid, toluenesulphonamide and ammonium sulphobenzoate) were assayed for their possible mutagenicity in several *Salmonella typhimurium* strains. No mutagenic activity was detected towards any strain, at any of the levels tested, either in the absence or presence of fortified rat liver post-mitochondrial fractions. It is suggested that greater attention should be paid to the potential mutagenic effects of the para forms of these impurities. VJG

55

Response of male rats to sodium saccharin ingestion: urine composition and mineral balance.
Anderson, R. L.
Food and Cosmetics Toxicology 17 (3) 195–200 (1979) [12 ref. En] [Procter & Gamble Co., Miami Valley Lab., Cincinnati, Ohio 45247, USA]

Sodium saccharin was fed to weanling male rats for 4 wk at levels up to 7.5% of the diet, to see whether it affects mineral disposition or urine characteristics. The low level of saccharin found in the blood cell cytosol, even when fed 7.5% sodium saccharin, shows that saccharin does not easily cross cell membranes. Plasma saccharin concn. were a linear function of the saccharin level in the diet. The lack of protein binding at the lowest dose suggests that this phenomenon has a threshold. At dietary levels of $\geq 3\%$, a dose-related fraction of the saccharin was bound to plasma protein. VJG

56

Sweetening composition.
Cook, M. K. (MacAndrews & Forbes Co.)
United States Patent 4 176 201 (1979) [En]

A sweetening composition is described which comprises a mixture of 85–95% sorbitol with minor amounts of potassium bitartrate, ammoniated glycyrrhizin and a 5' nucleotide. IFT

57

The case against poisoning our food.
Johnson, A.
Environment, USA 21 (3) 6–13 (1979) [25 ref. En]

The US Academy of Sciences recently published a report "Food Safety Policy: Scientific and societal considerations" (March 1979) in which the "rigidity" of current US legislation with regard to food additives is considered unsuitable for modern times. In view of pressure also exerted by the food industry and supporters of saccharin on the US Food and Drug Administration to relax the laws, the author puts the case for the necessity of the current official attitude, covering the Delaney Clause, the case for regulation, "flexible" law failures, and loopholes in the law. The author concludes that the existing food additives law is a valuable health measure. HBr

58

Biomolecular studies of a class of sweet compounds.
(In *'Flavor of foods and beverages'* [see FSTA (1980) 12 6A363].) [Lecture]
Ferguson, L. N.; Bragg, R. W.; Chow, Y.; Howell, S.; Winters, M.
pp. 91–96 (1978) [5 ref. En] [Dep. of Chem., California State Univ., Los Angeles, California, USA]

It has been suggested that the initial event in taste discrimination occurs at the surface of taste receptors and probably involves stereospecific adsorption. In connection with this theory, a wide variety of electronic and adsorption properties of 2-substituted (sweet) and 4-substituted (non-sweet) 5-nitroanilines were measured. Results indicated that the sweet isomers are weaker bases, have much smaller differences between ground state and excited state basicities, are harder to oxidize and have larger R_f values on polar and non-polar absorbents than the non-sweet isomers; most of the electronic effects can be rationalized in terms of physical-organic concepts. Extensive adsorption studies were made in an attempt to find a system which, either alone or combined with electronic properties, could distinguish sweet and non-sweet compounds, e.g. TLC studies were conducted with plates spread with

β-cyclodextrin and impregnated with selected salts, D- or L-amino acids, aspartame, neohesperidin dihydrochalcone or naringen; water, phosphate buffer, organic liquids or salt solutions were used as developing solvents. Results indicated that there are invariably differences between sweet and non-sweet isomers but there is no consistent pattern with sweetness. JA

59

[Palatinitol - manufacture, technological properties and analysis of palatinitol-containing foods.] Palatinit - Herstellung, technologische Eigenschaften und Analytik palatinithaltiger Lebensmittel.
Schiweck, H.
Alimenta 19 (1) 5-16 (1980) [19 ref. De, en]
[Süddeutsche Zucker AG, Postfach 1127, D-6718 Grünstadt 1, Federal Republic of Germany]

Palatinitol (so called because it was found in Obrigheim, in the Palatinate), the equimolecular mixture of α-D-glucopyranosyl-1,6-sorbitol (GPS) and α-D-glucopyranosyl-1,6-mannitol (GPM), is produced from sucrose in a 2-step process using enzymatic conversion of sucrose to isomaltulose (by *Protaminobacter rubrum*) and hydrogenation of the isomaltulose [see DT-OS 2 520 173 of 6 May 1975; patent application by Süddeutsche Zucker-AG, Mannheim]. The parameters for enzymatic conversion, crystallization and hydrogenation of isomaltulose, crystallization of isomaltitol and GPM are given in tables. Technological properties of palatinitol (sweetness, solubility, viscosity of aqueous solutions, resistance to acids and alkalis in melts and in aqueous systems) are described. Identification and detn. of palatinitol in foods and beverages are outlined (optical rotation, GLC, HPLC). A short discussion of the physiological properties of isomaltulose and palatinitol is followed by a list of applications as sugar substitute (in cakes and pastries, confectionery, puddings and desserts, or beverages). AS

60

[Isoglucose in foods.]
Botma, Y.
Voedingsmiddelentechnologie 12 (24) 13-17 (1979) [Nl, en] [Smaakcent. Naarden Int., Naarden, Netherlands]

After an initial survey of the history, preparation, relative sweetness and applications of isoglucose (high-fructose corn syrup), legal aspects and use of isoglucose in the USA, Canada, EEC countries, Hungary and Yugoslavia are discussed. AJDW

61

High mannitol process (enzymatic isomerization).
Kruse, W. M. (ICI Americas Inc.)
United States Patent 4 173 514 (1979) [En]

Mannitol-rich aqueous solutions of sorbitol and mannitol are prepared by epimerizing glucose in aqueous solution to obtain an epimerizate containing approx. 30% mannose and 70% glucose; contacting this glucose-mannose epimerizate with a glucose isomerase enzyme; and hydrogenating the resultant glucose-fructose-mannose solution. HBr

62

[Oximes with sweetening properties. XXIII. Unsaturated oximes.] Oxime mit Süssstoffeigenschaften. XXIII. Über ungesättigte Oxime.
Unterhalt, B.; Ghori, M.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 170 (1) 34-35 (1980) [7 ref. De, en]
[Fachbereich Pharmazie & Lebensmittelchemie, Univ. Marburg/Lahn, D-3550 Marburg/Lahn, Federal Republic of Germany]

The 5-thia analogue, its 4,6-dimethyl derivative, and the 5-oxa analogue of the known sweet tasting compound 1-cyclohexen-1-aldoxime were synthesized and their sweetness was evaluated. 5-thia-1-cyclohexen-1-aldoxime was slightly sweet; the other compounds synthesized had neutral tastes. [See *Archiv der Pharmazie* (Weinheim) (1979) 312, 746 for part XXII.] DIH

63

[Maltitol sweetener.]
Nikken Chemical Co. Ltd.
Japanese Examined Patent 5 427 323 (1979) [Ja]

A low calorie sweetener is prepared by coating maltitol particles with fine saccharide particles to form a non-caking powder. IFT

64

Thaumatin sweetener
Tate & Lyle Ltd.
UK Patent Application 2 015 533A (1979) [En]

A process is described for the extraction of a thaumatin sweetener composition from the dried pulp of the fruit *Thaumatococcus daniellii*. IFT

65

Natural sweetener.
Yamasa Shoyu Co. Ltd.
UK Patent Application 2 019 407A (1979) [En]

Natural sweeteners comparable to glycyrrhizin but having little or no bitter taste are obtained from *Periandra* roots. IFT

66

Lipophilicity and the perception of bitterness.
Gardner, R. J.
Chemical Senses and Flavour 4 (4) 275-286 (1979) [68 ref. En] [Group R&D Lab., Harp Lager Ltd., Manor Park, Alton, Hants. GU34 2PS, UK]

Evidence suggesting that lipophilicity is an important parameter in inducing a bitter taste is collated. The implications of this association are discussed and lipophilic effects used to explain some phenomena connected with the bitterness response. Consideration of lipophilicity offers a rationale for the observed bitterness of many sweeteners at high concn. and for the influence of hydrogen-bonding on bitterness. AS

67

Effects of rapidly phosphorylated substrates fructose, sorbitol, xylitol (glycerol): toxic or metabolic. [Lecture]
Sestoft, L.
Archives of Toxicology Suppl. 1, 151–155 (1978) [5 ref. En] [Hvidore Hospital, Emiliekildevej 1, DK-2930 Klampenborg, Denmark]

Derangement of liver metabolism as a result of intake of large quantities of rapidly phosphorylated substances (RPS; fructose, sorbitol, xylitol) from parenteral nutrition or food additive use is described, including effects on ATP concn., NAD redox couples, ion transport, enzyme regulation and hormone response. Long-term intake of high levels of RPS can have serious or fatal consequences, particularly if combined with illness, ethanol intake, hypoxia or exercise. It is recommended that RPS should not be used as sweeteners in foods such as soft drinks or ice cream. [See FSTA (1980) 12 7A448.] DIH

68

[Sweeteners in ice cream.]
Bray, F.
Industrie Alimentari 19 (1) 16–20 (1980) [14 ref. It, en]

This article discusses the use in ice cream of traditional sugars (sucrose, brown sugar, invert sugar, dextrose, glucose syrups, maltodextrins and honey) and non-traditional sweeteners (such as sorbitol, mannitol and xylitol). Details are given of the sweetening power of the various sweeteners and their effect on f.p., and examples are given of mix formulations containing them. ADL

69

Determination of α-L-aspartyl-L-phenylalanine methylester hydrochloride in soft drinks.
Vesely, Z.; Davidkova, E.; Prudel, M.
Nahrung 24 (6) 525–528 (1980) [6 ref. En, de, ru] [Res. Inst. for the Food Ind., Prague, Czechoslovakia]

A procedure for detn. of the title sweetener in soft drinks is described, based on separation by ion exchange chromatography on an Ostion LGKS 0802 column (elution with pH 4.5 citrate buffer), and detn. by spectrophotometry (at 570 nm) after reaction with ninhydrin reagent. A semi-automatic amino acid analyser system for this analysis, constructed using components of the AAA 888 automatic amino acid analyser system (manufactured by Mikrotechna Prague, Czechoslovakia) is described. Parallel analyses on 16 samples gave an average s.d. of 0.0176; variation coeff. was 0.81%. Recovery values for 4 different soft drinks, with 0.1% α-L-aspartyl-L-phenylalanine methyl ester hydrochloride added, ranged from 98.7 to 101.7%. Error was ±2%. IN

70

Monellin, a sweet-tasting protein, and the biochemistry of sweet taste. [Review]
Anon.
Nutrition Reviews 38 (1) 27–28 (1980) [13 ref. En]

Properties of monellin, a sweet tasting protein isolated from the tropical plant *Dioscoreophyllum cumminsii Diels*, and studies of binding of ^{3}H-labelled monellin to receptors in tongues are briefly reviewed. DIH

71

Artificial sweetener use and bladder cancer: a case-control study.
Wynder, E. L.; Stellman, S. D.
Science, USA 207 (4436) 1214–1216 (1980) [20 ref. En] [American Health Foundation, 320 East 43 Street, New York 10017, USA]

In a case-control study of 302 male and 65 female bladder cancer patients and an equal number of other patients matched to them in age, sex, hospital, and hospital-room status, no association was found between use of artificial sweeteners [commercial saccharin preparations] or diet beverages [containing 8–11 mg saccharin/oz] and bladder cancer. No dose-response was observed with respect to quantity or duration of use or the 2 combined. No evidence was found to suggest that artificial sweeteners or diet beverages promote the tumorigenic effect of tobacco smoking. Artificial sweetener and diet beverage use strongly reflected socioeconomic status among controls with various diagnoses. AS

72

Sugar substitute from Israel.
Anon.
Food Engineering International 4 (9) 38 (1979) [En]

Production of the sweetener neohesperidin dihydrochalcone by Jaf-Ora, Rehovot, Israel, from waste grapefruit peel is briefly described. Naringin is extracted from grapefruit peel and used as the feed ingredient of the process. Jaf-Ora at present produces 4 t of the sweetener/yr. DIH

73

Glycoside separation.
Matsushita, S.; Ikushige, T. (Toyo Soda Manufacturing Co. Ltd.)
United States Patent 4 171 430 (1979) [En]

A method is described for separating stevioside, glycyrrhizin, and neohesperidin components from phyllodulcin and perillartine components which involves passing a solution of a natural sweet extract over a column of porous organic gel. IFT

74

Determination of microgram quantities of stevioside from leaves of *Stevia rebaudiana* Bert. by two-dimensional thin layer chromatography.
Metivier, J.; Viana, A. M.
Journal of Experimental Botany 30 (117) 805–810 (1979) [10 ref. En] [Dep. de Fisiologia Vegetal, Inst. de Biol., Univ. Estadual de Campinas, Sao Paulo, Brazil]

Stevia rebaudiana contains stevioside, a diterpene glycoside, 300 times sweeter than sucrose, which is already being utilized as a natural sweetener in Japan. A method is described for detn. of stevioside in the leaves. Stevioside is separated on non-activated silica gel impregnated with boric acid in a 2-dimensional chromatographic system followed by elution and colorimetric assay. Effects of various solvent systems,

elution times, and activation of chromoplates are examined. The observed ratio of the optical density of glucose:stevioside matches that expected theoretically, so that glucose may be employed as a standard where pure stevioside is not available. VJG

75

The effect of long and short day length upon the growth of whole plants and the level of soluble proteins, sugars, and stevioside in leaves of *Stevia rebaudiana* Bert.
Metivier, J.; Viana, A. M.
Journal of Experimental Botany 30 (119) 1211–1222 (1979) [56 ref. En] [Dep. de Fisiologia Vegetal, Univ. de Campinas, UNICAMP, Inst. de Biol., Campinas 13100, Sao Paulo, Brazil]

Long-day conditions increase internode length, leaf area, and dry wt. and reduce the interval between appearance of successive leaf pairs in *S. rebaudiana* as compared with short days. Total soluble leaf sugars, protein, and stevioside content are also augmented in both absolute and relative terms, and biosynthesis of steviol, the aglucone present in stevioside, is increased by 45%. Interaction between DM, stevioside content, and day length is discussed and a theory for the biological role of stevioside as a possible defence mechanism against insect herbivory is proposed. AS

76

Intensity/time relationships in sweetness: evidence for a queue hypothesis in taste chemoreception.
Birch, G. G.; Latymer, Z.; Hollaway, M.
Chemical Senses 5 (1) 63–78 (1980) [27 ref. En] [Nat. College of Food Tech., Univ. of Reading, Weybridge, Surrey, UK]

Details of reaction time, total persistence time and time of protracted max. intensity of sweetness in relation to concn. of sucrose and thaumatin are presented. Reaction time approaches a constant value at an early concn. for both sweeteners and max. times for max. intensity occur at lower concn. than total max. persistence. These observations seem best explained by a 2-stage model of taste chemoreception, the first consisting of an orderly queue of stimulus molecules approaching the ionophor and the second being the depolarisation at the ionophor itself. The orderly queue model is capable of explaining all the temporal phenomena of sweet taste including the plateau of max. time at max. intensity which is observed at all concn. It also offers a novel view of the way in which intense sweeteners such as thaumatin may achieve their effects and broadens the scope for taste modifier research in the future. AS

77

Market trends show 90% HFCS potential in honey-flavoured sweetener, athletic beverages.
Young, L. S.
Food Product Development 13 (8) 34, 37 (1979) [3 ref. En] [ADM Corn Sweeteners, Cedar Rapids, Iowa, USA]

Consideration is given to the characteristics and applications of 90% high fructose corn sweeteners (HFCS). One of the latest developments is a honey flavoured sweetener. It offers the advantages of honey (sweetness, humectancy, flavour) and more. This 90% HFCS product is consistent in composition, solids, colour, flavour and quality. It can be used easily in recipes or at the table. A list of typical opportunities for reduced calorie foods is tabulated including the potential calorie reduction. Use of 90% HFCS in athletic beverages is discussed. VJG

78

Nutritive sweeteners made from starch. [Review]
MacAllister, R. V.
Advances in Carbohydrate Chemistry and Biochemistry 36, 15–56 (1979) [61 ref. En] [Clinton Corn Processing Co., Clinton, Iowa 52732, USA]

After a brief discussion of the development of industries involved in production of sweeteners from starch, the processes and principles of manufacture of nutritive sweeteners are reviewed. Aspects covered include processes and products based on hydrolysis reactions, especially corn syrup and crystalline D-glucose technology, both acid-catalysed and enzyme-catalysed systems being covered; and processes and products based on isomerization reactions, including nonenzymic and enzymic systems, especially processes for production of high fructose corn syrup. DIH

79

Sensory screening of synthetic sweeteners using time-intensity evaluations.
Swartz, M.
Journal of Food Science 45 (3) 577–581 (1980) [En] [Beatrice Foods Res. Cent., 1526 S. State Street, Chicago, Illinois 60605, USA]

To evaluate aftertaste (AT) in sweeteners, time-intensity (TI) sensory studies were conducted using individuals who recorded intensity of AT as time passed on a strip chart recorder. The panelists were first trained to consistently evaluate TI properties for common sweeteners such as sucrose and saccharin. The trained panel gave reproducible results on equal solutions, differentiated between various concn. of the same substance, and generated different TI curves for compounds which are known to vary in their taste onset and lingering AT. A selected panel was employed to evaluate the properties for certain newly synthesized sweeteners. IFT

80

[Stevioside sweetener.]
Banshu Chomiryo Co. Ltd.
Japanese Examined Patent 5 440 560 (1979) [Ja]

A process is described for the extraction of dried, ground *Stevia* stalks and leaves using a methanol-chloroform mixture to yield a stevioside sweetener. IFT

81

Differential pulse polarographic determination of saccharin in foods: collaborative study.
Holak, W.; Krinitz, B.
Journal of the Association of Official Analytical

Chemists 63 (2) 163-167 (1980) [9 ref. En] [FDA, 850 Third Avenue, Brooklyn, New York 11232, USA]

An improved differential pulse polarographic method for detn. of saccharin in foods has been developed. The sample (if solid) is blended with water; an aliquot is acidified with HCl, mixed with Celite, transferred to a chromatographic column, and eluted with chloroform. After chloroform is evaporated with a current of air, the residue is dissolved in 0.1N NaOH, and an aliquot is polarographed in a supporting electrolyte composed of 0.1N HCl, 0.1N KCl, and 0.1% tetrabutylammonium bromide. The method is sensitive, relatively precise, and applicable to a wide variety of foods. A collaborative study was conducted and results indicate average recoveries of 101.5, 99.8, 96.9, 91.9 and 95.3%, resp., for samples containing saccharin from 0.028 to 1.4%. The method has been adopted as official first action. AS

82

[Safety of stevioside as a new sweetening source.]

Lee, S. J.; Lee, K. R.; Park, J. R.; Kim, K. S.; Tchai, B. S.

Korean Journal of Food Science and Technology 11 (4) 224-231 (1979) [18 ref. Ko, en] [Dep. of Food & Nutr., Yeungnam Univ., Taegu, S. Korea]

The safety of the sweetening component of Stevia was studied by administrating it to rats. The LD_{50} determined by intraperitoneal injection was 3400 mg Stevia extract/kg which contained 50% stevioside, i.e. LD_{50} of stevioside was > 1700 mg/kg. Oral administration of large quantities of the Stevia extract for 56 days had no effect on growth of rats. The analyses of total blood (red blood cells, white blood cells, Hb and Hct), 17 blood serum components including total protein, glucose, cholesterol, GOT, and 11 parameters of liver tissues including nuclear deterioration of liver cells, proliferation of Kupffer cells, fibrosis of portal area, showed no significant differences between control and treatments except for lactate dehydrogenase activity after 56 day-oral administration of the extract. From the results obtained, it was concluded that the Stevia extract/stevioside revealed no acute or sub-acute toxic effects on rats. AS

83

***Stevia rebaudiana*. I. Use of *p*-bromophenacyl bromide to enhance ultraviolet detection of water-soluble organic acids (steviolbioside and rebaudioside B) in high-performance liquid chromatographic analysis.**

Ahmed, M. S.; Dobberstein, R. H.; Farnsworth, N. R.

Journal of Chromatography 192 (2) 387-393 (1980) [20 ref. En] [Coll. of Pharmacy, Univ. of Illinois Med. Cent., 833 S. Wood Street, Chicago, Illinois 60612, USA]

A method is described for the analysis of stevioside and rebaudioside A [potential non-caloric sweetening agents] from *Stevia rebaudiana* Bert. These compounds were hydrolysed to steviolbioside and rebaudioside B, resp., and reacted with *p*-bromophenacyl bromide and crown reagent to yield the corresponding chromophoric esters, which were separated and quantitated by HPLC. More generally, a method is described for maximizing ester yields from water-soluble organic acids by using methanol as the reaction solvent and adjusting reaction pH and time. AS

84

Sweeteners - a scientific and regulatory update. [Conference proceedings]

Hood, L. F. (**United States of America, Institute of Food Technologists**) (Chairman)

Food Technology 34 (1) 64-83 (1980) [many ref. En]

Papers presented at a symposium held during the 39th Annual Meeting of the Institute of Food Technologists, 10-13 June 1979 at St. Louis, Missouri, USA, are published. These include the following titles. Predicting sweetness from chemical structure and knowledge of chemoreception, by R. S. Shallenberger (pp. 65-66, 10 ref.). Nutrition, sweeteners and dental caries, by M. C. Alfano (pp. 70-74, 28 ref.). The high-sugar foods controversy, by G. A. Leveille (pp. 75-76, 83, 16 ref.). Applying science and technology in the political decision-making process, by W. G. Wells, Jr. & G. L. Ostenso (pp. 81-83, 11 ref.) 2 further papers are abstracted individually [see following 2 abstr.] DIH

85

Model studies on cake staling.

Maxwell, J. L.; Zobel, H. F.

Cereal Foods World 23 (3) 124-126, 128 (1978) [14 ref. En] [CPC Int. Inc., Moffett Tech. Cent., Argo, Illinois 60501, USA]

Sweetener/starch/water systems were used in model studies to test the interaction between these components. Initial studies were conducted on wheat starch gels made at various moisture levels to obtain an information base prior to analysing the more complex systems containing sweeteners. The 3 parameters used to evaluate the ageing characteristics are: intial rigidity, final rigidity, and time constant. The effects of moisture content on initial and final rigidities are shown. A description is given of model systems studies, a testing procedure, and ways of mathematically modeling the results to provide information on the role of different sweeteners in baked goods. The methods described can be used to optimize the performance of high dextrose syrups in snack cakes. Data also indicate that a modification of the final rigidity of a dextrose cake would be one means of improving performance. VJG

86

[Is saccharin a health hazard?] [Review]

Joner, E.

Norsk Veterinaertidsskrift 91 (1) 5-9 (1979) [7 ref. No] [Norges Veterinaerhogskole, Postboks 8146, Dep. Oslo 1, Norway]

The possible health hazard from use of saccharin in foods and beverages is discussed, with reference to: the structure and characteristics of saccharin; applications of saccharin in the food and cosmetics industries; toxicity and carcinogenicity of saccharin; animal feeding trials; epidemiological studies; characteristics of strong and weak carcinogens; WHO requirements for animal feeding trials; recent studies in the USA and Canada; the Delaney clause; and the justification for banning of use of saccharin in foods and beverages. AJDW

87

Intestinal degradation and absorption of the glycosidic sweeteners stevioside and rebaudioside A[1].
Wingard, R. E., Jr.; Brown, J. P.; Enderlin, F. E.; Dale, J. A.; Hale, R. L.; Seitz, C. T.
Experientia 36 (5) 519–520 (1980) [15 ref. En] [Biol. Sci. & Chem. Synthesis Lab., Dynapol, 1454 Page Mill Road, Palo Alto, California 94304, USA]

Contrary to prior indications, the glycosidic sweeteners stevioside and rebaudioside A are degraded to the diterpenoid aglycone steviol by rat intestinal microflora in vitro. A similar degradation can be predicted to occur in man. Studies with steviol-17-[^{14}C] showed the aglycone to be readily absorbed from the lower bowel of the rat following intracaecal administration. Analogous absorption from the human large bowel seems probable. AL

88

Sweetening the foods of the 1980's.
Anon.
Food Processing 40 (7) 34–35, 38, 40, 44 (1979) [En]

Prospects for the development and use of sweeteners for food and drinks in the 1980's are discussed, with reference to saccharin, aspartame, cyclamate, xylitol, sorbitol, honey high-fructose sweeteners, crystalline fructose, katemfe (marketed under the trade name Talin), phyllodulcin, stevioside, Lo Han sweetener (derived from the dried fruit of *Momordica grosvenori*, a product of Southern China); miraculin, and monellin. JRR

89

[Physiological problems related to the flavour of sweeteners. Review of literature.] [Review]
Dupaigne, P.
Fruits 34 (9) 563–567 (1979) [98 ref. Fr] [IRFA, 6, Rue du General Clergerie, 75116 Paris, France]

90

Saccharin may act as a tumour promoter by inhibiting metabolic cooperation between cells.
Trosko, J. E.; Dawson, B.; Yotti, L. P.; Chang, C. C.
Nature, UK 285 (5760) 109–110 (1980) [25 ref. En] [Dep. of Pediatrics & Human Development, Coll. of Human Med., Michigan State Univ., East Lansing, Michigan 48823, USA]

The possible role of saccharin in the carcinogenic process is still unclear. Carcinogensis is a complex process, and current evidence favours the hypothesis that initiation is due to a mutagenic event, while promotion (at least the early portion) is the result of epigenic changes. This paper reports a series of experiments demonstrating the elimination of 'metabolic cooperation' (a type of cell-cell communication between cells) in the hypoxanthine guanine phosphoribosyltransferase system in Chinese hamster V79 cells, indicating that saccharin shares properties similar to those of other known promoters. AL

91

[Method for obtaining polyalcohols, particularly xylitol.] Verfahren zur Gewinnung vor Polyalkoholen, insbesondere Xylit.
Riehm, T.; Auel, T.; Spatz, W. (Benckiser-Knapsack GmbH)
German Federal Republic Patent Application 2 827 477 (1980) [De]

Xylitol, which has anti-caries properties and is useful as a sugar substitute, particularly for diabetics, is prepared by extraction of soft wood or annual plants with dilute mineral acid at high temp., decolorization and deionization with the same ion exchange medium, followed by hydrogenation of the xylose so obtained. W&Co

92

[Effect of sodium saccharin and sodium cyclamate on water soluble vitamins and essential amino acids.]
Der Einfluss von Natriumsaccharin und Natriumcyclamat auf wasserlösliche Vitamine und essentielle Aminosäuren.
Kroyer, G.; Washüttl, J.
Zeitschrift für Ernährungswissenschaft 18 (2) 139–144 (1979) [9 ref. De, en] [Inst. für Lebensmittelchem. & Tech., Tech. Univ. Wien, Vienna, Austria]

Model experiments were conducted to investigate possible interactions between artificial sweeteners and components of foods. Sodium saccharin (SSA) and sodium cyclamate (SCY) were compared with sucrose (SUC); quantities of each substance compared were 300 mg, 3.5 g and 10 g, resp. Aqueous solutions of tryptophan and phenylalanine stored at room temp. showed large decreases in amino acid content with SSA or SCY, but not with SUC. No effects with other essential amino acids were observed in aqueous solution, nor with the water-soluble vitamins studied, except for vitamins C and B_1, which showed significant decreases in all cases. Treatment of vitamin C at 15°C for 1 h in various dry mixes gave the following % decreases: heated alone 0; + SSA 93%; + SCY 11%; + SUC 9%. Corresponding results for vitamin B_1 are 0, 33, 7 and 3%. Heat treatment (150°C) of dry mixtures of sweeteners and essential amino acids showed significant reductions in contents of amino acid only for phenylalanine, tryptophan or methionine with SCY, and for phenylalanine with SSA. No decreases were observed with sucrose. DIH

93

[Importance of enzyme analysis among food analytical methods. III. Analysis of vegetable foods.]
Vamosne Vigyazo, L.; Törley, D.
Elelmiszervizsgalati Közlemenyek 25 (1/2) 9–19 (1979) [103 ref. Hu] [Központi Elelmiszerkututo Intezet, Budapest, Hungary]

The increasing importance of enzymes and enzymatic methods in the analysis of the following foods are discussed: vegetable oils; cereals and bakery products; starch and starch products (starch hydrolysates); natural sweetening substances (sugar, honey, and syrups); fermented drinks (wine and beer); and fruits, vegetables and their products. ESK

94

Influence of saccharin on growth and tissue lipids in rats fed different fats and carbohydrates.
Watkins, A. L.; Williams, L.; Carroll, C.
Nutrition Reports International 21 (3) 329–339 (1980) [14 ref. En] [Home Economics Dep., Agric. Exp. Sta., Univ. of Arkansas, Fayetteville, Arkansas 72701, USA]

To determine whether or not saccharin affects tissue lipid concn., male Sprague-Dawley rats were given isocaloric diets that varied in type of fat, proportion of sucrose to rice starch, and saccharin content. Amounts of total liver lipid and liver cholesterol were greater and concn. of serum triglycerides were lower in rats fed sunflower oil (SO) than in those fed beef tallow (BT). Increasing the proportion of sucrose in the diet resulted in higher concn. of cholesterol and triglycerides in serum. In groups fed SO, addition of saccharin depressed total lipid in liver and fat pad and concn. of cholesterol in serum; but in groups fed BT, effects of saccharin were reversed. These results indicate that saccharin's effects on liver, serum, and adipose tissue lipids were determined partly by the type of fat in the diet. AS

95

[Stock bottle with arrangement for measured delivery.] Vorratsflasche mit Einrichtung zur dosierten Abgabe.
Müller's Mühle Müller GmbH & Co. KG
German Federal Republic Patent Application 2 831 913 (1980) [De]

A dispenser is described for delivering a given amount of liquid artificial sweetener on to food. It consists essentially of a bottle with a cap having a convex membrane built into it which on pushing into the concave position expresses the given amount of sweetener liquid through the nozzle in the cap. W&Co

96

Mixed sweeteners.
Barnangen AB
British Patent 1 559 989 (1980) [En]

Products such as confectionery and chewing gum are sweetened by mixtures of xylitol and sorbitol, in which the xylitol prevents the decomposition of the sorbitol when contacted with saliva, thus permitting the use of higher proportions of sorbitol. IFT

97

[Artificial sweetener.]
Takeda Chemical Industries Co. Ltd.
Japanese Examined Patent 5 511 301 (1980) [En]

Artificial sweetening agents are described which are free from bitterness comprising L-aspartyl-aminomalonic acid derivatives of alkyl fenchyl diesters. IFT

98

[Stevioside sweetener.]
Maruzen Kasei Co. Ltd.
Japanese Examined Patent 5 512 230 (1980) [Ja]

A process is described in which a liquid extract of the sweet compound from the leaves of *Stevia rebaudiana* Bertoni is treated with an adsorbent consisting of an Al-Mg complex oxide. IFT

99

[Sweetener.]
Hayashibara, K.
Japanese Examined Patent 5 512 231 (1980) [Ja]

Sweetening agents are described comprising of oligosaccharides having end groups bonded to fructose and useful as replacements for sucrose in foods and beverages. IFT

100

[New aspects of evaluation of sweetening power and use of sweetening agents.] Neue Aspekte der Süsskraftbeurteilung des Einsatzes von Süssungsmitteln.
Hoppe, K.; Gassmann, B.
Nahrung 24 (4/5) 423–431 (1980) [7 ref. De, en, ru] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

The sweetening power of sweeteners expresses sweetness relative to that of a reference substance. Determination of discrimination thresholds under certain conditions permits establishment of characteristic curves for the relationship between sweetener concn. and perception value, which may be described on the basis of concn. coeff. and the max. number of discrimination threshold steps. Synthetic sweeteners have higher concn. coeff. but lower max. discrimination threshold step number than sugars and polyols. Total substitution of synthetic sweeteners for sugar is therefore not possible. Blends of sweeteners (especially those containing cyclamate) show synergistic behaviour. Mutual interference of sweetener molecules at the taste receptor may influence perceived sweetness. Temp. may exert a considerable effect on sweetness; though it is explainable on the basis of the Boltzmann concept, temp. effects on sweetness cannot be predicted. IN

101

Artificial sweetener.
Hayashibara Seibutsu Kagaku Kenkyujo Co. Ltd.
UK Patent Application 2 027 423A (1980) [En]

Artificial sweeteners are described which do not have an unpleasant after taste and are based upon α-glucosyl-stevioside. IFT

102

Saccharin contaminants in focus.
Cooper, P.
Food and Cosmetics Toxicology 18 (1) 93–94 (1980) [8 ref. En] [British Ind. Biol. Res. Ass., Woodmansterne Road, Carshalton, Surrey, UK]

Papers which have been produced recently on the disposition and fate of 6 impurities of commercial saccharin are briefly considered. These provide additional information to be considered in the controversy over the long-term effects of saccharin, particularly over the significance to man of bladder tumours induced by saccharin in rats. VJG

103

Effects of dietary xylitol on digestive adaptation and plasma lipids in monkeys.
Emigh, G. M.; Branen, A. L.
Journal of Food Science 45 (4) 1023–1025, 1035 (1980) [En] [Dep. of Food Sci. & Tech., Washington State Univ., Pullman, Washington 99164, USA]

104

[Sugar substitutes: specifications and characteristics, with reference to Palatinit.] Zuckerersatzstoffe: Anforderungen und Eigenschaften am Beispiel von Palatinit.
Paulus, K.; Fricker, A.
Zeitschrift für Lebensmittel-Technologie und -Verfahrenstechnik 31 (3) 128–132 (1980) [21 ref. De] [Bundesforschungsanstalt für Ernährung, 7500 Karlsruhe 1, Federal Republic of Germany]

Required characteristics of sugar substitutes are discussed, with reference to taste, lack of cariogenic activity, solubility, stability, metabolic aspects, energy content and toxicology. Synthetic sweeteners and polyols are considered. The new sweetener 'Palatinit' (an equimolar mixture of α-D-glucopyranosido-1,6-mannitol and α-D-glucopyranosido-1,6-sorbitol) is described, with reference to its heat stability, chemical reactivity, nutritional/physiological characteristics, relative sweetness and taste profile. The sweetness of mixtures of Palatinit with other sweeteners is also considered; little synergistic effect of Palatinit with other sweeteners was observed. AJDW

105

Determination of glycyrrhizin in liquorice roots and extracts by high performance liquid chromatography.
Lunder, T. L.; Nielsen, C.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 71 (2) 236–241 (1980) [9 ref. En, de, fr] [Nestle Products Tech. Assistance Co. Ltd., La Tour-de-Peilz, Switzerland]

Glycyrrhizin is extracted from liquorice root by reflux with distilled water, the extract is centrifuged and filtered, and analysed by HPLC on Bondapak C_{18} with a (i) 0.1N KH_2PO_4/(ii) isopropyl alcohol gradient at a pressure of approx. 100 bar, flow rate 1.5 ml/min; a UV detector at 254 nm is used. The gradient profile was 2 min isocratic with 20% (ii)/(i) followed by a 5 min convex gradient to 85% (ii)/(i), 10 min isocratic with this mixture, 10 min returning to 20% (ii)/(i), and then 10 min conditioning of the column with the original mixture. Chromatograms of 2 liquorice root samples and 1 partially deglycyrrhizinated extract are presented. Mean values determined were 4.95 and 5.55% for the 2 liquorice root samples, 6.60% for the deglycyrrhizinated extract, and 45.81% for an ammoniacal extract. AJDW

106

Sweet taste involves several distinct receptor mechanisms.
Faurion, A.; Saito, S.; MacLeod, P.
Chemical Senses 5 (2) 107–121 (1980) [23 ref. En] [Lab. de Neurobiol. Sensorielle de l'Ecole Pratique des Hautes Etudes, CENFAR, BP No 6, 92260 Fontenay-aux-Roses, France]

Measures of human sensitivities to various sweet compounds conducted at threshold (91 subjects, 7 sweeteners) and at suprathreshold levels (9 subjects, 12 sweeteners) show interindividual differences. Multidimensional analysis indicated that sweet taste can be represented in a tridimensional continuum if 12 compounds are considered. Results are speculatively interpreted as indirect evidence for the existence of several receptor sites cooperating in sweet taste chemoreception. AS

107

[Method for producing a sweetening agent composition.]
Glas, P.; Ahlgren, D. (Barnängen AB)
Swedish Patent Application 403 036 (1978) [Sv]

A sweetening composition for use in sweets comprises a mixture of sufficient xylitol to inhibit acid formation and sorbitol, the ratio by wt. of xylitol to sorbitol being ≤1:3. W&Co

108

Immobilized enzyme technology commercially hydrolyzes lactose.
Moore, K.
Food Product Development 14 (1) 50–51 (1980) [En]

Lactose can be enzymically converted into high quality glucose-galactose sweetener syrups exhibiting increased solubility, sweetness and crystallization stability compared to lactose. Syrup production occurs in 5 steps as whey, whey permeate or milk permeate move through the 3-component system.
A deproteinized, demineralized substrate (solids level <20% and pH <3.5) is added to a feed tank. Tank temp. is controlled at 35–50°C and pH adjusted to maintain a constant hydrolysis rate and throughput. The product is pumped into the top of an immobilized enzyme column. As it passes down the column, lactose is hydrolysed and glucose, galactose and residual lactose withdrawn at the bottom. No other products are formed. Following hydrolysis, glucose and galactose normally are concentrated to a 60%-plus solids syrup and the column cleaned by daily backflushing with dil. acetic acid. Each unit operates continuously, processing 360–500 l. of lactose/h with an 80% average hydrolysis rate. Approx. 30 000 l of whey yield 1.7 t of hydrolysed syrup. Advantages of hydrolysed lactose sweeteners are considered. VJG

109

[Non-caking maltitol.]
Nikken Chemical Co. Ltd.
Japanese Examined Patent 5 516 439 (1980) [Ja]

Maltitol low calorie sweeteners are rendered non-caking by the incorporation of a finely divided saccharide. IFT

110

Enhancement of the perceived sucrose sweetness in the rat by thaumatin.
Villard, X. D. du; Wel, H. van der; Brouwer, J. N.
Chemical Senses 5 (2) 93–98 (1980) [8 ref. En] [Unilever Res., Saint-Denis, France]

After conditioned aversion to a 0.18 mol/l sucrose solution rats do not reject a solution of 0.03 mol sucrose/l (near threshold) or a solution of thaumatin (0.2 g/l), which elicits no response in the rats' taste nerves. However, a mixture of the latter 2 solutions is rejected just as the 0.18 mol/l sucrose solution. This means that for the rat the mixture has a sucrose-like taste. So, thaumatin enhances sucrose-like sweetness in this animal. Electrophysiological measurements in the *chorda tympani* indeed show an enhancement of the sucrose response of almost 20% by the addition of thaumatin (0.2 g/l) to a sucrose solution of 0.5 mol/L
AS

111

[Condensed isothiazol-3-(2H)-on-1,1-dioxide, method of preparation and usage.] Kondensierte Isothiazol-3(2H)-on-1,1-dioxide, Verfahren zu deren Herstellung und deren Verwendung.
Trummlitz, G.; Engel, W.; Seeger, E. (Dr. Karl Thomae GmbH)
German Federal Republic Patent Application 2 839 266 (1980) [De]

Condensed isothiazol-3(2H)-on-1,1-dioxide and its pharmaceutically acceptable salts with inorganic or organic bases are described for manufacture and use as artificial sweeteners comparable with saccharin.
W&Co

112

Artificial sweetener.
Wang, P. C.; Wingard, R. E., Jr.; Crosby, G. A. (Dynapol)
United States Patent 4 204 007 (1980) [En]

Artificial sweeteners containing 4-dihydroxyhexoxydihydrochalcone compounds are prepared by electrophilic addition of the 3-sulpho-5,6-dihydroxyhexyl group to the corresponding flavones, using epoxysulphone, and then converting to the dihydrochalcone. SP

113

Synthesis of aspartyl tripeptide esters in relation to structural features of sweet peptides.
Ariyoshi, Y.
Agricultural and Biological Chemistry 44 (4) 943-945 (1980) [12 ref. En] [Cent. Res. Lab., Ajinomoto Co., Inc., Suzuki-cho, Kawasaki-ku, Kawasaki 210, Japan]

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FAB 3

NATURAL AND SYNTHETIC SWEETENERS

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H. BROOKES

EDITOR

1

[Analysis of acesulfame by HPLC.] Analyse von Acesulfam-K durch Hochdruckflüssigkeitschromatographie.
Grosspietsch, H.; Hachenberg, H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 171 (1) 41–43 (1980) [6 ref. De, en]
[Hoechst AG, Forschung Aliphatische Zwischenprodukte D 569, Postfach 80 03 20, D-6230 Frankfurt/Main 80, Federal Republic of Germany]

A rapid HPLC method for detn. of the sweetener acesulfame in beverages and solid foods is described. Liquid foods are filtered through a 0.04 μm Millipore filter and directly injected into the liquid chromatograph; solid foods are suspended in water and the suspension is strongly agitated before centrifugation, filtration and injection. HPLC conditions are: LiChrosorb RP18 (10 μm), eluent methanol/water (10/90 v/v) + 0.01M tetrabutylammonium hydrogensulphate, detection by UV-photometer at 227 nm. Analysis time is approx. 12 min, s.d. is 0.01–0.1% and limit of detection is <1 μg acesulfame/g substrate. DIH

2

[R&D in sugar manufacture.]
Kovarik, A.
Listy Cukrovarnicke 95 (11) 253–256 (1979) [Cs]
[Vyzkumna a Vyvojova Zakladna Cukrovarnickeho Prumyslu, Prague, Czechoslovakia]

Information presented at a Czech sugarmakers' conference in 1979 is summarized. It covers simulated reception of beets by quality; flexible piling of pre-washed beets; long-term storage of washed beets; mechanized filter presses; mechanization of crystal substrate preparation; storage of sugar in silos; manufacture and storage of liquid sugar; and computer controlled boiling of sugar. STI

3

[Influence of water solubie vitamins and essential amino acids on the stability of sodium saccharin and sodium cyclamate under thermal treatment.] Einfluss von wasserlöslichen Vitaminen und essentiellen Aminosäuren auf die Stabilität von Natriumsaccharin und Natriumcyclamat bei thermischer Behandlung.
Kroyer, G.; Washüttl, J.
Lebensmittel-Wissenschaft und -Technologie 12 (5) 284–286 (1979) [12 ref. De] [Inst. für Lebensmittelchemie und -Tech., Tech. Univ. Wien, Getreidemarkt 9, A-1060 Vienna, Austria]

Thermal stability of sodium saccharin and sodium cyclamate was tested up to 250°C in the presence of water soluble vitamins, essential amino acids and olive oil. Pure sodium saccharin was hardly destroyed at all when heated to 350° for 1 h; however a reduction in the quantity of sodium saccharin occurred at relatively low temp. (150°) with addition of a mixture of the water-soluble vitamins C, B_1, B_2, B_6, B_{12}, nicotinic acid amide and rutin, or a mixture of the essential amino acids isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. Heat treatment of a mixture of sodium saccharin and olive oil resulted, on the other hand, in no marked loss of the sweetener. Thermal decomposition of sodium cyclamate was already observable at 200°, both for the pure substance and for a mixture of sodium cyclamate and olive oil; no cyclamate could be detected after heating for 1 h at 250°C. Following addition of water soluble vitamins or essential amino acids, sodium cyclamate was already completely destroyed at 200°C. Simultaneously with the decomposition of sodium cyclamate, rising temp. was accompanied by increasing quantities of cyclohexamine, a toxic decomposition product of sodium cyclamate. MJD

4

Potassium-magnesium-calcium glycyrrhizin.
Hartung, A. (MacAndrews & Forbes Co.)
United States Patent 4 176 228 (1979) [En]

A flavouring or sweetening agent comprising potassium-magnesium-calcium glycyrrhizin and a process for recovering this product from liquorice root are described. AS

5

[Determination of *o*-toluenesulphonamide in saccharin by HPLC.] Bestimmung von *o*-Toluolsulfonamid in Saccharin mit Hilfe der Hochdruckflüssigkeitschromatographie.
Köbler, H.
Lebensmittelchemie und Gerichtliche Chemie 34 (3) 77 (1980) [5 ref. De] [Chem. Landesuntersuchungsanstalt Stuttgart, Postfach 1219, 7000 Stuttgart 1, Federal Republic of Germany]

A procedure is described for detn. of *o*-toluenesulphonamide in saccharin preparations, based on extraction of the saccharin from an aqueous solution with methylene chloride, evaporation of the extract to dryness, dissolving the dry residue in methanol (containing ethylvanillin standard) and HPLC on a Lichrosorb RP-18 column, using a 0.01M phosphate buffer (pH 6.5)/acetonitrile (85:15) mobile phase and a UV detector (at 220 nm). Detection limit is 1 p.p.m. for 20 μl of the methanol solution applied, for the sample extraction and preparation conditions used. AJDW

6

[The status and labelling of sweeteners in the context of the new Food Laws in the EEC.] Stellung und Kennzeichnung von Süssungsmitteln im Rahmen des neuen Lebensmittelrechts.
Thier, E.
Deutsche Lebensmittel-Rundschau 76 (7) 238–242 (1980) [De]

Current legislation for sugars and other sweeteners in the EEC and the Federal Republic of Germany is discussed, with reference to: sugars; polyols; artificial sweeteners; legal classification of sweetening agents as additives or as foods; limitations on sugar substitutes in foods; labelling requirements for sweeteners and foods containing sweeteners; and tolerances for sugar substitutes in foods. AJDW

7

[Use of ammonium glycyrrhizate as foaming agent during manufacture of souffle-type sweets.]
Badanov, Sh. Sh.; Antokolskaya, M. I.
Khlebopekarnaya i Konditerskaya Promyshlennost'
No. 1, 35–36 (1980) [Ru] [Vses. Nauchno-issled. Inst. Konditerskoi Promyshlennosti, USSR]

Glycyrrhizate, the ammonium salt of glycyrrhizic acid, possesses a higher foam forming capacity than the acid. A method for detn. of foaming capacity and stability of foams was devised and the procedure and apparatus used are described. The glycyrrhizate foam weighed 160 kg/m^3 and no water separated after 2 h. Foam produced from egg whites under equal conditions weighed 330 kg/m^3 and 3.2% of water separated. When egg whites with glycyrrhizate were used in the ratio of 1:1 the glycyrrhizate flavour was completely eliminated and the product maintained its physical properties. STI

8

[Technological characteristics of the manufacture of pralines with xylitol.]
Zubova, R. G.; Khodak, A. P.
Khlebopekarnaya i Konditerskaya Promyshlennost'
No. 2, 34–35 (1980) [Ru]

The technology is somewhat different from that in which sucrose is used, as xylitol has a low m.p. and is highly hygroscopic. During many experiments it was established that the most favourable condition was to use xylitol with 1.3–1.5% water content. The effect of refining time on viscosity and fluidity limits was studied and 20 to 25 min was found to be most satisfactory. It was also found to be optimal to use 36–37% fat in the mass; half of the fat should be added prior to the refining process. STI

9

Improved meringue.
Meili, R. (Firma Schoxi AG)
United States Patent 4 210 679 (1980) [En]

A process is described for the manufacture of a xylitol-containing meringue which retains its stiffness for a prolonged period of time after whipping. IFT

10

[Stevioside purification.]
Mitsubishi Chemical Industry Co. Ltd.
Japanese Examined Patent 5 523 061 (1980) [Ja]

Stevioside is purified by contacting a solution with an adsorbing resin followed by elution with a solvent and contact with an amphoteric ion exchange resin. IFT

11

Health and sugar substitutes. [Conference proceedings]
Guggenheim, B. (European Research Group for Oral Biology) (Editor)
viii + 351 pp. ISBN 3-8055-2961-9 (1979) [many ref. En]
Basel, Switzerland; S. Karger AG [Dep. of Oral Microbiol. & General Immunology, Dental Inst., Univ. of Zurich, Zurich, Switzerland]

This publication records the proceedings of an International Conference on Sugar Substitutes which comprised the 20th meeting of the European Research Group for Oral Biology held in Geneva, Switzerland in 1978. It includes a Preface, an extensive series of authoritative background papers (pp. 1–287) and a detailed record of panel discussions (pp. 289–351). The basic theme was a fear that excessive consumption of sucrose has created major health risks and that sucrose in foods should be replaced by other sweeteners; consequently the objections raised against other sweeteners (suspected to be unjustified) should be re-examined. Panel discussions considered the public health evidence for substituting sugar; the metabolism and safety of substitutes, including non-nutritive sweeteners (saccharin, cyclamates) and nutritive sweeteners (sorbitol, xybitol); practical problems of replacing sugar in foods; new (i.e. undeveloped) natural sweeteners; detailed aspects of sweeteners in relation to oral health; and toxicity testing and legal aspects of risk assessment. The following 22 background papers are primarily of medical-dental or purely chemical interest. Obesity and diabetes, by A. E. Renold, M. Berger and B. Jeanrenaud (pp. 17–21, 17 ref.). The possible role of polyhydric alcohols in the pathogenesis of vascular disease and neuropathy in diabetes mellitus, by R. S. Clements (pp. 22–26, 13 ref.). Mutagenicity of saccharin impurities, by D. R. Stoltz, B. Stavric and R. Klassen (pp. 36–40, 8 ref.). The metabolism, distribution and elimination of non-nutritive sweeteners, by A. G. Renwick (pp. 41–47, 31 ref.). Replination and permeability in the animal model, by T. A. Lawson (pp. 48–53, 35 ref.). End points in bladder carcinogenesis, by D. B. Clayson (pp. 54–57, 17 ref.). Short term prescreening tests for carcinogenicity, by C. Schlatter (pp. 58–63, 20 ref.). [Continued in following abstract] ELC

12

Health and sugar substitutes. [Conference proceedings]
Guggenheim, B. (European Research Group for Oral Biology) (Editor)
vii + 351 pp. ISBN 3-8055-2961-9 (1979) [many ref. En]
Basel, Switzerland; S. Karger AG [Dep. of Oral Microbiol. & General Immunology, Dental Inst., Univ. of Zurich, Zurich, Switzerland]

[Continued from preceding abstr.] Syncarcinogenic action of saccharin and sodium cyclamate in the induction of bladder tumours in MNU-pretreated rats, by U. Mohr, U. Green, J. Aethoff and P. Schneider (pp. 64–69, 3 ref.). Co-carcinogenicity testing of saccharin and DL-tryptophan following oral initiation with *N*-[4-(5-nitro-2-furyl)-2-thiazolyl] formamide, by S. M. Cohen, J. B. Jacobs, M. Arai and G. H. Friedell (pp. 70–75, 6 ref.). Chronic bioassay review, by J. C. Munro and D. L. Arnold (pp. 76–81, 17 ref.). Non-nutritive sweeteners and human bladder cancer, by J. J. Kessler (pp. 85–90, 15 ref.). Hepatic metabolism of xybitol, by A. Jakob (pp. 98–102, 4 ref.). α-D-glucanopyranosido-1,6 sorbitol and α-D-glucanopyranosideo-1,6 mannitol (Palatinit), by G. Siebert and U. Grupp (pp. 109–113, 5 ref.). Microbial metabolism in the lower gut, by M. J. Hill (pp. 120–122, 5 ref.). In-vivo assessment of plaque acid production. A

long-term retrospective study, by T. Imfeld (pp. 218–223, 10 ref.). Testing of sugar substitutes in animals with special reference to non-specific effects, by K. G. König (pp. 224–228, 9 ref.). Cariogenic properties of sugar substitutes examined in gnotobiotic rat experiments, by F. Gehring (pp. 229–234, 17 ref.). Metabolic criteria indicative of cariogenicity in primates, by W. H. Bowen (pp. 235–240, 14 ref.). Clinical trials on sugar substitutes, by A. Schreinin (pp. 241–246, 22 ref.). Setting criteria for appropriateness of various carbohydrate sweeteners, by K. K. Mäkinen (pp. 247–252, 16 ref.). Value of toxicological testing in chemical carcinogenicity, by D. Schmähl (pp. 260–261). Advantages and disadvantages of artificial sweeteners and sugar substitutes, by H. Mehnert (pp. 262–265, 4 ref.). Evaluation of results of animal data with respect to extrapolation, by R. Kroes (pp. 272–276, 4 ref.). A further 25 papers are of direct food interest, and are abstracted separately; they are listed in the author index under European Research Group for Oral Biology [20th Symposium]. ELC

13

[Artificial sweetener.]
Sanyo Kokusaku Pulp Co. Ltd.
Japanese Examined Patent 5 520 663 (1980) [Ja]

A mild sweetness is imparted to foods and beverages by employing the waste mother liquor from which stevioside has been crystallized. IFT

14

Low calorie sweetener.
Muhlemann, H. R.
British Patent 1 566 821 (1980) [En]

Low calorie sweetened food compositions (beverages, bakery products, confectionery, preserves) are described in which sorbose is substituted for a portion of sucrose, and are used in a molar ratio of 1:0.5, 1:1 or 1:50 resp. IFT

15

Scientific basis for regulatory decisions on saccharin. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Cranmer, M. F., Jr.
pp. 281–287 (1979) [9 ref. En] [13924, Rivercrest Drive, Little Rock, Arkansas 72212, USA]

The evidence for a ban on the use of saccharin in foods is reviewed in relation to recent investigations of a possible relation to bladder cancer. It is concluded that these have disclosed no association between saccharin and malignancy; earlier adverse results may have been due to impurities in the saccharin preparation. Conversely the medical profession is more concerned with the advantages of saccharin for control of dental caries, obesity, diabetes and hyperkinesis. ELC

16

Regulatory aspects of the use of sugar substitutes in Denmark and Norway. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Poulsen, E.
pp. 277–280 (1979) [5 ref. En] [Inst. of Toxicology, Nat. Food Inst., DK-2860 Soborg, Denmark]

In the Nordic countries the common sugar substitutes are legally classed as food additives, not drugs, and authorized for use on a positive list system. In Norway saccharin, sorbitol and xylitol may be used in foods and a list of the individual foods and permitted quantities for each is given; cyclamate is permitted in special diabetic foods (sweetening powders, soft drinks, ice cream, chocolates). In Denmark no food can be labelled, 'for diabetics' but the wording 'sugar-free' is permitted. Cyclamate can be sold only as tablets, with the Acceptable Daily Intake defined as 4 mg/kg body wt. Xylitol is permitted only in chewing gum. Mannitol and sorbitol are classed both as sweeteners and stabilizers; as stabilizers they are permitted to a max. concn. of 50 g/kg food in mayonnaise, jams, and fine bakery products and sorbitol additionally as a stabilizer or sweetener in ice cream, chewing gum, lozenges and domestic preparations. Saccharin is permitted for domestic use as tablets or powders, in a wide range of foods (including foods in which sorbitol can be used) and in soft drinks (in practice the major use). ELC

17

Long-term studies on the potential carcinogenicity of artificial sweeteners in non-human primates. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Sieber, S. M.; Adamson, R. H.
pp. 266–271 (1979) [11 ref. En] [Nat. Cancer Inst., National Inst. of Health, Bethesda, Maryland 20014, USA]

Cyclamates were banned for food use in USA in 1970 and similar action on saccharin was proposed in 1977 (later postponed), based on experiments in which rats fed large doses of sweetener developed bladder tumours. This action is criticized because later experiments have not confirmed the results and use of rats to assess risks to humans presents serious sources of error and unreliability (discussed in detail). Non-human primates should yield more reliable results than rats. Tests with e.g. monkeys can only use smaller numbers of animals vs. rats, but monkeys are phylogenetically closer to man, their metabolic pathways are similar and their life span permits test doses which simulate actual human exposure. A colony of 600 monkeys (4 spp.) has been established from which newly-born animals are isolated for testing. Monkeys were given oral doses of either 100 mg or 500 mg cyclamate/kg body wt. (equivalent to human intakes of 2.3 or 11.6 g/day) over an average period of 94 months, or of 25 mg saccharin/kg body wt. over average 89 months. Practically all were still alive and in good condition according to frequent clinical, biochemical and haematological tests and veterinary inspections. Post-mortems after 4 cyclamate and 2 saccharin deaths revealed no evidence of carcinogenic effects. ELC

18

Acid production from sucrose substitutes in human dental plaque. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Birkhed, D.; Edwardsson, S.
pp. 211–217 (1979) [14 ref. En] [Dep. of Oral Microbiol., Univ. of Lund, S-214 21 Malmo, Sweden]

Acid production in dental plaque was measured by 2 methods. In (i), plaque scraped from teeth was homogenized in phosphate buffer at pH 6.8, and suspension aliquots maintained at 37°C were titrated at intervals in automatic apparatus with 0.002 N NaOH. 1 ml of 0.2 M glucose solution (control) or 1 ml of other test sweeteners were added to the series of aliquots. Acid production rate/min was recorded as acid/mg wet plaque and also as a % of the acid production rate by glucose. In method (ii) plaque from different tooth areas as in (i) was pooled, transferred to distilled water and the pH determined; the subject then rinsed the mouth for 30 s with a conc. solution of sucrose, glucose or sugar substitute and pH of plaque samples taken at intervals from 2 to 30 min later was determined. Results are shown for the substitutes mannitol, sorbitol, xylitol, Lycasin (French and Swedish), lactose, fructose, inert sugar and glucose syrups. Acid production rate was very high for glucose, sucrose, fructose and invert sugar; nil for mannitol and xylitol; and low for sorbitol, maltitol, and French Lycasin. Recommended caries 'safety-levels' are: method (i) acid production rate ≤30% that of glucose or sucrose; and method (ii) max. pH drop of 0.4 after 10 min and no value below pH 6.5. ELC

19

Criteria indicative of cariogenicity or non cariogenicity of foods and beverages. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Newbrun, E.
pp. 253–258 (1979) [25 ref. En] [Dep. of Oral Med., School of Dentistry, Univ. of California, San Francisco, California 94143, USA]

Cariogenicity of a food, for which no single test is satisfactory, involves multiple factors, i.e. variations in individual conditions in teeth and saliva (imperfectly measured by in vitro tests); the particular microflora; the substrate (variable mixed diets); time and frequency of consuming food (major meals, between meals). Animal or human feeding trials can be influenced by taste preferences which may reduce consumption of a test substance, possibly undetected. Negative fermentation of a substitute in vitro by plaque organisms denotes non-cariogenicity, but positive results may not always indicate cariogenicity e.g. mannitol is fermented by *Strep. mutans* to acid in vitro but does not lower plaque pH in vivo. Plaque pH changes can be measured by removing a sample or directly in vivo by biotelemetry, but can only predict tendencies to acid production which may not always correlate closely with cariogenicity or carbohydrate content of the food e.g. diffusion rates into plaque differ between starches, di- or monosaccharides. It is only possible to suggest 'non-safety' e.g. a pH fall below 5.7 in 30 min. A major weakness of human clinical trials is that tests of individual foods can be influenced by other foods in a mixed diet (rarely sugar-free); nevertheless a standard test should not conflict seriously with clinical experience. Animal feeding tests are easier to standardize. All methods (data given) indicate that caries risk is related in general (not strictly quantitative) to a high sucrose content in foods. Compulsory labelling of sucrose content on retail food packs is advocated. ELC

Technological problems in the incorporation of hydrogenated glucose syrups and L-sucrose (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Zimmermann, M.
pp. 145–152 (1979) [30 ref. En] [Food Dep., Roquette Freres - 62136 Lestrem, France

Some products developed originally to remedy dental caries have additional technological properties which render them superior to sorbitol, xylitol and mannitol for some food applications. Lycasin 80/55 contains sorbitol and hydrogenated di-, tri- and polysaccharides. It is fluid, can be cold-stored, does not crystallize at high concn. or when dried; in hard boiled sweets it is hygroscopic (special wrapping required) and residual moisture should be ≤0.5% instead of 2–3%. With 1% moisture it is semi-plastic and useful in chewing gums. It has no reducing properties and is not subject to brown discoloration at high temp. Sweetness is 75% of that of sucrose with less masking of acid flavours. Jellies can be produced at neutral pH with gelatin, pectin and gum arabic. L-sorbose, a reducing sugar produced by bacterial fermentation of D-sorbitol is only slightly hygroscopic, has 90% of the sweetness of sucrose, and a similar flavour, with solubility of 45% at 20°C and 65% at 90°C. Brown colorations are formed by heat caramelization or reactions with amino acids. It is unsuitable for hard-boiled sweets due to slow solidification when cooling the mass after boiling, but can be used for compressed sweets, in chewing gum (recipes given), as a crystal coating for hygroscopic products, in high quality chocolate and enrobing couvertures (requiring no processing changes) and in jams, pastries, ice cream and soft drinks. ELC

21

Potentials of the oral microflora to utilize sugar substitutes as energy source. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Carlsson, J.
pp. 205–210 (1979) [14 ref. En] [Dep. of Oral Microbiol., Univ. of Umea, S-901 87 Umea, Sweden]

The potential ability of oral microorganisms to utilize sugar substitutes will depend upon their adaptability to the changing environment in the mouth, and an essential genetic flexibility of the microorganisms. The metabolic pathways involved and the enzyme systems likely to be required to deal with different sugars and sugar substitutes are discussed. From consideration of these requirements in relation to conditions in the oral cavity, supported by some clinical observations, it is concluded that there is little risk of adaptation by the oral microflora to sugar substitutes as the sole source of carbon and energy. ELC

22

Carbohydrates, sugar substitutes and oral bacterial colonization. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Houte, J. van
pp. 199–204 (1979) [52 ref. En] [Dep. of Microbiol., Forsyth Dental Cent., 140 Fenway, Boston, Massachusetts 02115, USA]

Evidence is reviewed which indicates that sucrose is a particularly potent source of plaque formation and colonization of teeth by *Streptococcus mutans* and lactobacilli; replacement of sucrose in the diet by other sugars and carbohydrates reduces *S. mutans* numbers and increased sucrose leads to higher numbers. Exact data for other spp. of streptococci and Actinomyces are not available. It is pointed out that *S. mutans* lactobacilli and yeasts are relatively acid-tolerant and will be favoured by the low pH attained in plaque. Replacement of dietary sucrose by sorbitol may not always delay plaque formation but reduces the microbial population and acid producers; xylitol significantly reduces plaque formation and is not fermented by oral bacteria. The effect of these sugar substitutes is similar to that of reducing dietary sucrose and is expected to be the same for other poorly fermentable sugar substitutes e.g. sorbose and maltitol. ELC

23

Some bacteriological aspects of sugar substitutes. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Havenaar, R.; Huis in 't Veld, J. H. J.; Backer Dirks, O.; Stoppelaar, J. D. de
pp. 192–198 (1979) [12 ref. En] [Dep. of Preventive Dentistry & Oral Microbiol., Univ. of Utrecht, Sorbonnelaan 16, Utrecht, The Netherlands]

Experiments are reported on partial replacement of sucrose by other sweeteners to prevent or delay acid production without enhancing dental plaque formation. Sweeteners studied in vitro were sorbitol, xylitol, lactitol, maltitol, L-sorbose and lycasin. Cultures used were type cultures from dental laboratories plus direct isolates from human subjects, including 4 *Streptococcus* spp., 3 *Actinomyces* spp. and *Lactobacillus casei*. Measurements included acid production from glucose and sugar substitutes, fermentation by non-growing, resting cells of *Streptococcus mutans* and *L. casei*, polysaccharide formation and adherence to glass by *S. mutans* in the presence of sugars. All the microorganisms fermented glucose, but fresh, actively growing oral microorganisms were unable to ferment xylitol and rarely sorbase. Resting cultures of *S. mutans* and *Actinomyces* spp. probably showed some adaptation with very slow fermentation of sorbitol, lactitol, maltitol and lycasin, giving delayed bacterial growth rather than suppression; *L. casei* showed some adaptation, probably unimportant, to sorbose. Recent animal experiments suggest that addition of xylitol to a sucrose diet inhibits caries. ELC

24

Potential intense sweeteners of natural origin. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Inglett, G. E.
pp. 184–190 (1979) [36 ref. En] [N. Reg. Res. Cent., USDA, 1815 N. University Street, Peoria, Illinois 61604, USA]

Potential natural plant sweeteners are reviewed briefly. Amacha (dried leaves of *Hydrangea macrophylla*) contains the intensely sweet substance phyllodulcin. Yerba dulce *(Stevia rebaudiana)* of Paraguay contains the sweet glycoside stevioside and 2 newly isolated glucosides (rebaudiosides) which are reported to be non-toxic and to pass unchanged through human elimination channels. Glycyrrhizin, well known as licorice extracted from roots of *Glycyrrhiza glabra* in Europe and Central Asia, is used in confectionery and various beverages. The ammonium salt of the glycoside glycyrrhizic acid (AG) is 50 × sucrose sweetness and is now commercially available. Lo Han (fruit of *Momordica grosvenori*), dried and widely used medicinally in S. China, contains a triterpenoid glycoside with a pleasant taste and 400 × sucrose sweetness plus a lingering licorice-type flavour; it is easily extracted with water or 50% alcohol. Miracle fruit *(Synsepalum dulcificum)* of W. Africa contains a taste-modifying substance which causes sour food (particularly fruits) to taste sweet; the active constituent has been found to be a glycoprotein with no inherent taste but able to sweeten acid tastes in 4×10^{-7}M concn. The serendipity berry of W. Frica *(Dioscoreophyllum cumminsii)* contains an intensely sweet principle (2500 × as sweet as sucrose) now known to be a protein which has been named monellin. The African fruit *Thaumatococcus danielli* also contains an intense sweetener (1600 × as sweet as sucrose) known as Katemfe, comprising 2 proteins (thaumatin I and [II] with alanine as the N-terminal amino acid. ELC

25

Acesulfame-K, a new noncaloric sweetener. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Arpe, H.-J.
pp. 178–183 (1979) [2 ref. En] [Hoechst AG, Postfach 800320, 6230 Frankfurt (M) 80, Federal Republic of Germany]

Acesulfame-K, a new sweetener developed by Hoechst AG and registered under the generic name of 'acesulfame potassium salt' is basically a complex derivative of acetoacetic acid. Its chemical constitution is given, together with the method of industrial synthesis. Acesulfame-K is largely stable for several months at temp. ≤40°C and pH 3–8. Hydrolysis to (mainly) acetone and CO_2 occurs under extreme condition below pH 2.5 or in the strongly alkaline range. Aqueous solutions can be sterilized and stored for 1 month at 40°C without hydrolysis, and N-nitroso groups cannot be introduced into the molecule. Sweetness is about 200 × that of 3% sucrose solution and is perceived very quickly, then falls off gradually without leaving an unpleasant after-taste. Very favourable results have been obtained with hot and cold drinks, fruit juices, bakery and milk products. Extensive toxicological trials (details given) have produced no adverse results. ELC

26

Talin – a novel sweet protein from *T. daniellii*. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Higginbotham, J. D.
pp. 172–177 (1979) [3 ref. En] [Tate & Lyle Ltd., Group Res. & Dev., PO Box 68, Reading RG6 2BX, Berks., UK]

Talin is a mixture of 3 extremely sweet proteins present in the fruit of *Thaumatococcus danielli*, which grows abundantly in W. Africa. The proteins (thaumatins) have mol. wt. about 21 000 and can be separated, but the individual proteins are less sweet than the mixture. Detailed amino acid compositions are tabulated. Talin is extremely sweet (for most applications 3000 × sucrose sweetness). Perception of sweetness is longer than with sucrose but the sweet after-taste lasts much longer e.g. 1 h; the delayed perception can be reduced by mixing with sugars or saccharin. Talin begins to lose sweetness at temp. above 45°C. Its calorific value is similar to that of carbohydrate sweeteners but this becomes negligible at the extremely low level of use and Talin is very suitable for reduced calorie and diabetic foods. Combinations of Talin and saccharin are also very useful. Freeze-dried Talin is stable indefinitely; aqueous solutions are susceptible to bacterial attack. Sweetness disappears below pH 1.8 or above pH 11.0. The major application is to create distinctive long-lasting flavours, and successful uses include fruit drinks, sweetening tablets for tea and coffee, various desserts and dairy products. ELC

27

Dihydrochalcone sweeteners. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Horowitz, R. M.; Gentili, B.
pp. 166–171 (1979) [13 ref. En] [USDA, Fruit & Vegetable Chem. Lab., 263, South Chester Avenue, Pasadena, California 91106, USA]

Flavonoid constituents of orange, grapefruit and lemon include flavanone glycosides which are either bitter or tasteless, but can be readily reduced to extremely sweet dihydrochalcones and are available in large quantities. The most important compounds are neohesperidin dihydrochalcone (NHDC), naringin dihydrochalcone (NRDC) and 4-β-D glucoside (HDG). Starting compounds are first converted to the respective chalcones and thence to dihydrochalcones either by hydrogenation with a catalyst or by enzyme treatment. HDG could be produced from abundant by-products already available in the orange and lemon processing industries; commercial development of NHDC and NRDC might be slower. The compounds have a pleasant sweetness, with values relative to sucrose of NHDC × 1000 and NRDC and HDG × 300. Onset of sweetness on the palate is slower than with sucrose but lingers longer. They also have pronounced ability to mask bitter flavours, e.g. of grapefruit. Rat feeding trials over 2 yr have produced no evidence of toxicity. ELC

28

Aspartame metabolism in human subjects (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Stegink, L. D.; Filer, L. J., Jr.; Baker, G. L.; Brummel, M. C.; Tephly, T. R.
pp. 160–165 (1979) [5 ref. En] [Dep. of Pediatrics, Univ. of Iowa, Coll. of Med., Iowa City, IA 52242, USA]

Aspartame, a new dipeptide sweetener has 180–200 × the sweetness of sucrose but doubts have been expressed concerning possible toxicity of its breakdown products phenylalanine, aspartate and methanol. Feeding trials are reported which showed that with normal use Aspartame is metabolized very rapidly with no significant accumulation of breakdown products by normal adults or by individuals heterozygous for phenylketonuria, 1 yr-old infants or lactating women (including their milk). Gross abuse e.g. extremely high intakes, might possibly produce undesirable levels of methanol. ELC

29

Practical problems of cyclamate and saccharin incorporation in foodstuffs. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Wolf, E.
pp. 153–158 (1979) [14 ref. En] [1-11, Gereonsmuehlengasse, D-5000 Cologne, Federal Republic of Germany]

Saccharin and cyclamate provide sweetness without calorific value (valuable for slimming and diabetic diets), are compatible withh most food materials, stable over a wide range of temp. and pH conditions and their Na and Ca salts are very soluble in water. Due to high sweetness they are normally mixed or dried with carrier powders or used as solutions. Granular, soluble, low calorie products having the same appearance and spoon-for-spoon sweetness as sugar but <90% of the calorie and carbohydrate content are produced by drying the sweetener with soluble starch hydrolysate and possibly sodium citrate. Other sugar function e.g. imparting bulk, texture, colour development as in many baked goods cannot be maintained by simple replacement with sweetener. Saccharin levels >8% sugar sweetness produce diminishing sweetness and increasing bitterness e.g. in jam. Saccharin after-taste is reduced in a 1:10 saccharin:cyclamate mixture or by adding traces of citrates, tartrates, chlorides or lactose to saccharin. Replacement of >50% of sucrose in soft drinks is difficult with saccharin but possible with cyclamates. In liquid milk products e.g. yoghurt, total sugar replacement is possible, but some foods may require an alternative bulking agent e.g. cellulose products, gelatin, alginates, pectin, carrageen. Jams and jellies based on a sugar-pectin-acid gel require a gelling agent (gum or carrageen) if sucrose is replaced by sweetener. ELC

30

Palatinit® – technological properties. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Schiweck, H.
pp. 138–144 (1979) [6 ref. En] [Cent.-Lab. of Süddeutsche Zucker-AG, Postfach 1127, D-6718 Grünstadt 1, Federal Republic of Germany]

Palatinit (a patented hydrogenated isomaltulose) is an equimolecular mixture of glucopyranosyl-sorbitol (GPS) and glucopyranosyl-mannitol (GPM); the components can be separated by fractional crystallization from water and are more difficult to hydrolyse in acid solutions than sucrose. Both GPS and GPM have about 45% of the sweetening power of sucrose with a similar taste pattern, and m.p. of the same order; heat treatment does not produce water elimination and caramelization and Maillard reactions do not occur during storage. Solubility is lower than that of sucrose, but high enough for most processing requirements. However, GPM crystallizes out if highly

saturated Palatinit solutions are cooled, as in jams with >50% DM. Applications to date are in confectionery, ice cream, jam, cake recipes, icings, puddings and beverages. ELC

31

Xylitol: food applications of a noncariogenic sugar substitute. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Voirol, F.
pp. 130-137 (1979) [18 ref. En] [Xyrofin Ltd., Lattischstrasse 8a, 6340 Baar, Switzerland]

Potential uses of xylitol (commercially available only since 1974) are discussed. Sucrose in foods adds bulk as well as sweetness and is difficult to replace. Thus sorbitol (half as sweet as sucrose) requires twice the bulk to produce the same sweetness level and artificial sweeteners contribute no bulk; mixtures of both are sometimes used to obtain a desired sweetness:bulk ratio. Xylitol (non-cariogenic) has the same sweetness as sucrose and similar organoleptic quality. Most food spoilage microorganisms are unable to utilize xylitol so that xylitol syrups are microbiologically stable, as compared to sucrose syrups which can be stored only in conc. form with high osmotic pressure. Xylitol is also chemically stable e.g. when heated at high food processing temp., no esterification occurs during heating in solution with e.g. citric acid and, being free from aldo or keto groups, no Maillard reactions occur with amino acids during food storage. Xylitol melts at 94°C and recrystallizes readily; its physical properties could be useful to the confectionery industry. ELC

32

Sorbitol as a sugar substitute: some factors clouding new product prospects. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Mackay, D. A. M.
pp. 124-129 (1979) [En] [Res. & Development, Life Savers, Inc., 40 West 57th Street, New York, New York 10019, USA]

Advantages of sorbitol are that it resembles sucrose in appearance, is crystalline, very soluble in water, harmless to teeth and safe for diabetics; it has about half the sweetness of sucrose but the same calorific value. Although sorbitol is now available commercially and is legally permitted, food use remains small apart from extensive use in chewing gums and as a humectant rather than a sugar substitute. Its appeal has been limited to foods in which sucrose is the major constituent e.g. sweets, chocolate, but processing of some of these is difficult with sorbitol and in addition it is more expensive than sucrose. Sorbitol is also laxative if consumed in large amounts. Nevertheless there is a good case for sucrose substitution by sorbitol in jams and jellies. ELC

33

Hydrogenated starch hydrolysates. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Leroy, P.
pp. 114-119 (1979) [7 ref. En] [Roquette Freres, 62136, Lestrem, France]

Hydrogenation of starch hydrolysis products can produce a wide range of compounds differing according to the degree of hydrolysis of the starch (degree of polymerization). Compared with sucrose, these compounds have less tendency to induce dental decay, a reduced blood glucose response and reduced browning reactions in foods. Hydrogenation produces the corresponding polyol e.g. sorbitol from glucose, maltitol from maltose. The most desirable product is obtained by using high levels of both hydrolysis and hydrogenation to produce e.g. 66% maltitol, 28% hydrognated higher polysaccharides and 6% sorbitol. ELC

34

Sugar alcohols in animal and human nutrition. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Mäkinen, K. K.
pp. 103-108 (1979) [14 ref. En] [Sect. of Biochem., Inst. of Dentistry, Univ. of Turku, SF-20520, Turku 52, Finland]

This review of sugar alcohols includes the uses of xylitol and sorbitol in diets to replace sucrose or glucose. These substances occur naturally, have a good flavour and are incorporated easily into foods. No adverse effects of their use have been reported. A safe daily intake of xylitol for adults is suggested to be 50-100 g, with rather less for sorbitol. ELC

35

Safety of nutritive sweeteners: fructose and sorbitol. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Berghe, G. van den
pp. 92-97 (1979) [27 ref. En] [Lab. de Chimie Physiologique, Univ. de Louvain, Belgium]

On the basis of literature data, it is concluded that consumption of high levels of fructose stimulates synthesis of fatty acids and formation of triglycerides to a greater extent than does the feeding of starch. Ideally fructose consumption should not exceed the levels found in a normal well-balanced diet. ELC

36

Sucrose in human nutrition - importance of delineation of safe ingestant levels - a current survey. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Campbell, G. D.
pp. 2-9 (1979) [11 ref. En] [Durban Diabetes Study Project, PO Box 30048, 4058, Mayville, South Africa]

No accurate data are available on sugar consumption and there is no evidence that sugar is an essential human nutrient. More widespread campaigns to reduce sugar consumption are highly desirable as a protection against a high incidence of obesity and diabetes. It is considered that per capita sugar consumption should not exceed 32 kg/yr and that retail prices should not be reduced by subsidies. Reduced production could encounter strong opposition from commercial interests, popular tastes, and highly adverse social effects on employment, but nevertheless the use of alternative sweeteners should be encouraged. ELC

37

Psychological correlates of sugar consumption. (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56]) [Lecture]
Moskowitz, H. R.
pp. 10–15 (1979) [14 ref. En] [MPI Sensory Testing, Inc., 770 Lexington Avenue, New York, New York 10021, USA]

Qualitative differences between different sugars and sugar substitutes are discussed in relation to 'sweetness quality', with data on sweetness, 'liking' and after-taste of cyclamate, saccharin and aspartame. A numerical expression is given which relates sweetness intensity to concn. of sucrose, glucose and sorbitol, but this psychophysical relation does not apply to saccharin-type sweeteners which exhibit a changing equilibrium between sweetness and underlying bitterness. For adults sweetness acceptability rises with concn. (in wt/vol. aqueous solution) to a peak at 9% for sucrose and 18% for glucose, then diminishes with higher concn. 'Liking' tends to increase in mixtures with other foods. Artificial sweeteners are more variable and usually must be sweeter than sugars to be equally liked. ELC

38

Experiments in rats on the question of a possible carcinogenic effect of cyclamate, cyclohexylamine, saccharin and orthotoluolsulphonamide (OTS). (In 'Health and sugar substitutes' [see FSTA (1981) 13 2T56].) [Lecture]
Schmähl, D.
pp. 82–84 (1979) [3 ref. En] [Inst. of Toxicology & Chemotherapy, German Cancer Res. Cent., 6900 Heidelberg, Im Neuenheimer Feld 280, Federal Republic of Germany]

No evidence was found of carcinogenic effects in rats following feeding of cyclamate, cyclohexylamine, saccharin or orthotoluolsulphonamide. ELC

39

[Neohesperidin dihydrochalcone (NHDC): purity control in relation to production and GLC determination in soft drinks.]
Tateo, F.; Cavalli, S.
Essenze Derivati Agrumari 50 (1) 9–20 (1980) [13 ref. It] [Istituto di Tecnologie Alimentari, Univ., Milan, Italy]

Methods of NHDC detn. (TLC, HPLC, GLC) are reviewed. For detn. in soft drinks, GLC was preferred, using a LiChrosorb RP-8 column and aqueous methanol as mobile phase. The recommended working conditions were also suitable for purity control of synthetic NHDC, and for its detection in drinks and dietetic products. Results are illustrated by a series of chromatograms. RM

40

Determination of saccharin in Watts nickel plating solutions by first derivative ultraviolet spectrometry.
Fix, G. L.; Pollack, J. D.
Analytical Chemistry 52 (11) 1589–1592 (1980) [6 ref. En] [Raytheon Co., Equipment Div. Lab., Sudbury, Massachusetts 01776, USA]

An accurate method for detn. of small concn. of saccharin in the presence of plating salts (used in the electroplating industry) is discussed. First-derivative UV spectrometry was used to enhance, separate and quantify saccharin's spectral features from those of the plating solution. A detection limit of 0.1 p.p.m. was obtained by simple electronic differentiation of the absorbance spectrum. The effect of absorbance background, temp. and pH of a sample were studied and are discussed. Cursory studies show that food and beverage samples which contain sodium saccharin exhibit similar spectral features and that this method could easily be applied. Some results are given. It is reported that samples of artificially sweetened puddings and cocoa were analysed but interfering absorptions and turbidity prevented the direct detn. of saccharin by this method. AL

41

Fructose: comparison with sucrose as sweetener in four products.
Hardy, S. L.; Brennand, C. P.; Wyse, B. W.
Journal of the American Dietetic Association 74 (1) 41–46 (1979) [21 ref. En] [Dep. of Nutr. & Food Sci., Utah St. Univ., Logan, Utah, USA]

Investigations were carried out to determine if fructose was sweeter than sucrose in a variety of products ((i) sugar cookies, (ii) white cake, (iii) vanilla pudding and (iv) lemonade). Each product was prepared with 100, 50 and 25% of the specified recipe sugar quantity, using 3 sugar variables; sucrose, fructose equal to sucrose by wt., and fructose equal to sucrose by vol. The products were rated for relative sweetness, flavour, texture and overall acceptance. Fructose was not determined to be sweeter than sucrose in (i), (ii), or (iii) and many times sucrose was ranked significantly sweeter than fructose in these products. On an equal wt. basis, fructose was considered sweeter than sucrose in lemonade. When the level of sugar decreased, so did the flavour and overall acceptance ratings. At the 50% level (i), (ii) and (iii) were acceptable; (iv), however, was not. VJG

42

Long-lasting chewing gum and method.
Witzel, F.; Mackay, D. A. M.; Bakal, A. I.; Clark, K. W. (Life Savers Inc.)
United States Patent 4 217 368 (1980) [En]

A chewing gum consists of a water soluble phase containing a 1st sweetener, and a relatively water-insoluble phase containing a dispersed particulate 2nd sweetener with slower release properties. IFT

43

Plasma and erythrocyte amino acid levels of adult humans given 100 mg/kg body weight aspartame.
Stegink, L. D.; Filler, L. J., Jr.; Baker, G. L.; Brummel, M. C.
Toxicology 14 (2) 131–140 (1979) [47 ref. En] [Pediatrics & Biochemistry, S265 Hospital School, Univ. of Iowa City, Iowa 52242, USA]

Aspartame (L-aspartyl-L-phenylalanyl methyl ester) is a dipeptide with a sweetening power 180–200 times that of sucrose. In order to study the potential toxic effects of absorption of the peptide, or its constituent amino acids and methanol, into the bloodstream, 100 mg/kg body wt. aspartame was administered in either slurry or

solution form to 3 male and 3 female volunteer healthy adults. This is considered to be an abuse dose, equivalent to consumption of 10 l of aspartame-flavoured beverage at one sitting. Blood aspartate, phenylalanine and methanol levels did not exceed those associated with toxic findings in any case. The results indicated rapid metabolic clearance of the breakdown products. Greater variations in plasma aspartate and phenylalanine levels and blood methanol were noted when aspartame was given in slurry form. JRR

44

[Sensory properties of a new sweetener formula containing aspartame and xylitol.]
Dumas, G.; Sauvageot, F.
Annales de la Nutrition et de l'Alimentation 34 (1) 121–130 (1980) [8 ref. Fr, en] [ENSBANA, Campus Univ. F-21100 Dijon, France]

Various sweeteners, viz. xylitol, aspartame (L-aspartyl- L-phenylalanine methyl ester), saccharin, lactose and sucrose, were tasted by a trained panel. The intensity of sweetness was determined by using the multiple paired comparison techniques (each judge tested 9 pairs of samples, 1 of the pair being a 20 g/l or 60 g/l sucrose solution). The results agreed with previously published data. Taste quality was determined with solutions or with powders at the same granulometry. In each case sucrose is compared to a sweetener. Statistical analysis showed that xylitol, laevulose and the aspartame-xylitol, mixture (25×10^{-3}g:1 g or 2.4:97.6%) had a taste identical with that of sucrose. Stability studies on the mixture in sealed ampoules at pH 3 to 7, temp. +4° to +120°C showed that xylitol is not decomposed even after complete breakdown of aspartame. At pH 4 and in the presence of xylitol, aspartame is stable for 3 wk at ambient temp. and for 45 min at 120°C, showing that the mixture with a sweetness intensity of 5.0 is a good synthetic sweetener: it can be used in warm, sterilized or lightly cooked foods. RM

45

[Natural sweetener.]
Sanyo-Kokusaku Pulp Co. Ltd.
Japanese Examined Patent 5 526 819 (1980) [Ja]

A process is described for the extraction and isolation of sweetening substances and stevioside found in the leaves of *Stevia rebaudiana* Bertoni. IFT

46

[Low calorie sweetener.]
Sun Star Hamigaki
Japanese Examined Patent 5 526 820 (1980) [Ja]

A low calorie, sweet, stevia plant leaf extract is obtained by heating dried leaves with a halogenated hydrolysed starch. IFT

47

Artificial sweetener.
Miyake, T. (Kabushiki Kaisha Hayashibara Seibutsu Kagaku Kenkyujo)
United States Patent 4 219 571 (1980) [En]

A process for producing a sweetener containing α-glycosyl stevioside allows α-glucosyltransferase to react on an aqueous solution containing stevioside and α-glucosyl sugar compound. IFT

48

Artificial sweetener.
Piampiano, C.
United States Patent 4 219 579 (1980) [En]

An artificial sweetener comprises saccharin and at least sufficient aqueous extract of *Gentiana lutea* to reduce the bitter aftertaste of saccharin. IFT

49

Artificial sweetener.
Hoechst AG
British Patent 1 568 875 (1980) [En]

Sweeteners comprise mixtures of an aceto-sulpham sweetener and a 2nd sweetener, such as an aspartyl peptide ester. IFT

50

Review of quantitative analyses for limonin, naringin, naringenin rutinoside, hesperidin, and neohesperidin dihydrochalcone in citrus juice by high performance liquid chromatography. [Lecture]
Fisher, J. F.
Proceedings of the International Society of Citriculture pp. 813–816 (1977) [19 ref. En] [Florida Dep. of Citrus, Univ. of Florida, IFAS, Agric. Res. & Education Cent., PO Box 1088, Lake Alfred, Florida 33850, USA]

Analytical methods for quantifying constituents of citrus fruit are outlined. 2 HPLC procedures for limonin estimation are available. One uses a normal phase (silica) column and a chloroform/acetonitrile eluting system with refractive index detection. The other uses UV detection at 210 nm with a reverse phase column and a water/methyl alcohol eluting system. Both methods work at a rate of 6 analyses/4 h. Naringin and its tasteless isomer naringenin rutinoside are resolved from filtered grapefruit juice on an octadecyltrichlorosilane (ODS) column and eluted with water/acetonitrile. UV detection is at 280 nm and 6 analyses take 3 h. Hesperidin isolated from filtered orange juice on an ODS column using water/acetonitrile as the eluting system is detected at 285 nm. Neohesperidin dihydrochalcone is detected at 280 nm after elution from an ODS column with a water/acetonitrile mixture. [See FSTA (1981) 13 4J486.] LH

51

The industrial utilisation of sugar and mill by-products. [Book]
Kort, M. J.
175pp. (1978) [1776 ref. En] Durban, South Africa; University of Natal, Sugar Milling Research Institute

This book covers the literature published in 1977, and includes the following chapters: By-products from sugar manufacture (food uses of molasses, toxicity of food fibres including bagasse, alcohol, spirits, single-cell protein and glucose syrup production) pp. 3–36; Livestock feeding, pp. 37–57; Industrial uses of refined sugar (food and non-food uses) pp. 58–77; Recent developments in sucrochemistry (sucrose esters, miscellaneous compounds of sucrose and other sugars; sucrose ethers) pp. 78–102; Nutrition and toxicology pp. 103–122; Other sweeteners, natural and synthetic (34 headings) pp. 123–172; Summary and conclusions pp. 173–175. RM

52

Xylitol. Experimental and clinical investigations conducted in the USSR. [Review]
Nesterin, M. F.
Zeitschrift für Ernährungswissenschaft 19 (2) 88–94 (1980) [29 ref. En, de] [Nutr. Inst., Moscow, USSR)

Studies performed in the USSR on toxicity and other effects of xylitol are reviewed, including toxic effects on animals, clinical observations on human xylitol use by patients suffering from diabetes, coronary atherosclerosis and gastroenteric and other diseases, and effects of xylitol on progress of experimental diseases in animals. Xylitol is approved by the Pharmacological Committee of the USSR for food and medical use; some aspects of use of xylitol in dietetic foods, and production of xylitol are also briefly reviewed. DIH

53

Aromatization of dihydrothiophenes. Thiophene saccharin: a sweet surprise.
Rossy, P. A.; Hoffmann, W.; Müller, N.
Journal of Organic Chemistry 45 (4) 617–620 (1980) [19 ref. En] [BASF Aktiengesellschaft, Cent. Lab., 6700 Ludwigshafen/Rhein, Federal Republic of Germany]

Sulphuryl chloride was shown to be highly effective in the dehydrogenation of 3,4-disubstituted-2,5-dihydrothiophenes and 2,3-disubstituted-4,5-dihydrothiophenes, in which the 3,4 and 2,3 substituents are part of a β-keto carbonyl functionality or its enol derivatives. Its use in the preparation of the key intermediate for the synthesis of the new artificial sweetener thiophene saccharin is described. AS

54

Taste properties of cocoa drinks with an added bitter/sweet sugar: intensity/time effects.
Birch, G. G.; Ogunmoyela, G.
Journal of Food Technology 15 (5) 549–555 (1980) [7 ref. En] [Nat. Coll. of Food Tech., Univ. of Reading, St. George's Avenue, Weybridge, Surrey KT13 0DE, UK]

Cocoa drinks treated with either sucrose or the bitter/sweet sugar methyl α-D-mannopyranoside were evaluated for their intensity/time response determined by taste panellists using a moving chart recorder. Both additives caused an increase in persistence as well as intensity of response, sucrose for sweetness and methyl α-D-mannopyranoside for bitterness. Tasting of the sucrose-treated drinks, after presaturating panellists' tongues with quinine sulphate solutions, caused no significant differences in perceived sweetness. However, presaturating panellists' tongues with sucrose solution did cause significant differences in bitterness perception of the drinks containing methyl α-D-mannopyranoside. These results accord with a previous observation of the taste response to methyl α-D-mannopyranoside in pure water and suggest that the bitter/sweet molecule may exert its effect by simultaneously spanning both basic taste receptors. AS

55

New applications expand HFCS markets, increase demand and tighten supplies.
Anon.
Food Product Development 13 (12) 38 (1979) [En]

Consideration is given to expected increases in the use of high fructose corn syrup (HFCS) and corn-derived sweeteners in beverages, baked goods and dairy products in 1980. Increased demand is anticipated in the following areas: pourable salad dressings, soft drinks, frozen yoghurt, capping frozen fruit (55% HFCS) and as a table top sweetener (90% HFCS) by weight watchers and health conscious consumers. VJG

56

[Hydrolysis of stevioside and determination of total stevioside with dual-wavelength TLC scanner.]
Iwamura, J.; Kinoshita, R.; Hirao, N.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] 54 (3) 195–200 (1980) [8 ref. Ja, en] [Dep. of Applied Chem., Fac. of Sci. & Eng., Kinki Univ., Kowakae, Higashiosaka-shi 577, Japan]

Hydrolysis of stevioside (a constituent of *Stevia rebaudiana* leaves with sweetening properties) with mineral acid and trifluoroacetic acid was studied; reaction of stevioside with 2.5N trifluoroacetic acid gave an almost quantitative yield of isosteviol. The amount of isosteviol produced in this reaction was measured with a dual-wavelength TLC scanner. Concn. was linearly related to absorbance in the range 10–120 mg/ml. The advantages of the method included simple operation and short time, and a greater range for measurements than is available with other methods. [From En summ.] JRR

57

[Method for removal of silicic acid from sugar solutions.] Verfahren zur Entfernung von Kieselsäure aus Zuckerlösungen.
Buckl, H.; Brenner, B. (Süd-Chemie AG)
German Federal Republic Patent Application 2 843 736 (1980) [De]

Silicic acid is removed from sugar solution obtained by acid hydrolysis of carbohydrate (preferably xylan)-containing materials of vegetable origin (e.g. oat husks). The hydrolysate is diluted with a soluble Al or Fe (III) salt, the solution is neutralized, and the silicic acid-containing precipitate is removed. The resultant xylose may be used in the food industry. HBr

58

[Possibilities for practical use of lactase.]
Petersen, K. L.
Maelkeritidende 93 (15) 410 (1980) [Da]

It is estimated that 90% of the world population are lactase-deficient and therefore lactose-intolerant. The incidence of lactase deficiency varies widely from region to region, ranging from 2% in Sweden to 100% in Japan and among the black and Hamitic peoples of Africa (with intermediate figures of 16% for Switzerland, 24% for the UK and USSR and 64% for black Americans). These figures demonstrate the need for dairy products based on lactase-treated milk. The various products of this type are discussed in 3 broad categories, viz.: non-cultured products, e. g. ice cream, where lactose hydrolysis prevents the problem of sandiness, permits use of more milk solids and reduces the need for sucrose and stabilizers; cultured milk products, e.g. Cottage cheese, where use of lactase-treated milk is reported to improve cheese quality and increase yield by 5–12%; and ripened cheeses such as Cheddar, where use of lactose-hydrolysed milk is claimed to reduce manufacturing and ripening time. Sweeteners and soft drinks based on glucose and galactose derived from lactose are mentioned. ADL

59

Sweeteners and health. [Booklet]
World Sugar Research Organisation Ltd.
38pp. (1979) [many ref. En] [58 Jermyn Street, London, SW1, UK]

This booklet includes chapters on: nutritive sweeteners i.e. saccharides (glucose, fructose, high-fructose syrup, lactose, maltose, galactose, sorbose); polyols (sorbitol, xylitol, lycasin, palatinit); non-nutritive sweeteners, i.e. synthetics (cyclamates, saccharin, Acesulfam-K, aspartame, tryptophan derivatives, terpene oxime derivatives, alkoxy aromatic amines, sucrose derivatives e.g. 1",4,6" trichlorodeoxy galacto sucrose); and non-synthetics (dihydrochalcone sweeteners, talin, phyllodulcin, stevioside, glycyrrhizin, Lo Han Kno, osladin, miracle fruit, serendipity berries – monellin). In addition to brief descriptions of the alternative sweeteners, this booklet indicates some practical considerations to be borne in mind when sugar substitution is considered. RM

60

[USAL – a new low-calorie sweetener.]
Tesarik, B.
Vinohrad 18 (8) 184 (1980) [6 ref. Cs] [Lachema, n.p. Brno. Zavod Kaznejov, Czechoslovakia]

USAL is a synthetic of α-L-aspartyl-L-phenylalanine methyl ester with a sweetening capacity 150–200 × that of sugar. A limitation is its low stability in solution at temp. around 100°C, or in strongly acid or alkaline media. It is most stable in weakly acid environments with pH between 3 and 4. USAL can partly substitute sugar in some products. STI

61

Bladder cancer and artificial sweeteners: a methodological issue.
Bross, I. D. J.
Science, USA 210 (4468) 447–448 (1980) [6 ref. En] [Roswell Park Memorial Inst., 666 Elm Street, Buffalo, New York 14263, USA]

In a technical comment the author states that the appropriate conclusions to be drawn from the data on artificial sweeteners and bladder cancer reported by Wynder & Stellman [see FSTA (1980) 12 8T381] are quite different from those given, due to their statistical analysis. However, in their reply, Wynder & Stellman reexamine the data and see no reason to change their conclusions. AL

62

[Analysis of dietetic foods with a reduced sucrose content, and containing artificial sweeteners.]
Bellomonte, G.; Lelli, L.
Rivista della Societa Italiana di Scienza dell'Alimentazione 9 (4) 271–276 (1980) [13 ref. It, en] [Lab. degli Alimenti, Istituto Superiore di Sanita, Rome, Italy]

A GLC method for detn. of sugars and artificial sweeteners in dietetic foods is described. 3 columns are used, i.e. 3% OV 17, 5% XE 60 or 3% OV 225, each on Chromosorb WHP 80-100 mesh; the sugars or other sweeteners are determined as their acetate, trimethylsilyl or oxime-trimethylsilyl derivatives. Separation and recovery are good. The method is applicable to detn. of sucrose, fructose, glucose, lactose, mannose, mannitol, sorbitol, m-inositol, xylitol and saccharin. Tables of data are given for declared and actual concn. of sugars and sweeteners in various dietetic foods (biscuits, chocolate, jams, sweets, soft drinks) and sweetener preparations. Sugar and sweetener concn. found agreed well with label declarations. AJDW

63

An intensely sweet analogue of kynurenine: 3-(4-chloroanthraniloyl)-D-L-alanine
Kawashima, K.; Itoh, H.; Yoneda, N.; Hagio, K.; Moriya, T.; Chibata, I.
Journal of Agricultural and Food Chemistry 28 (6) 1338–1340 (1980) [8 ref. En] [Res. Lab. of Applied Biochem., Tanabe Seiyaku Co. Ltd., 16-89, Kashima-3-chome, Yodogawa-ku, Osaka 532, Japan]

A new kynurenine derivative, 3-(4-(chloroanthraniloyl)-DL-alanine, was synthesized from 6-chloro-DL-tryptophan. The former compound was found to be approx. 80× sweeter than sucrose by organoleptic tests. AS

64

[Studies on analysis of glycyrrhizinic acid in foods.]
Kanmuri, M.; Nishijima, M.; Kan, K.; Nakazato, M.; Kimura, Y.; Naoi, Y.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 29 (1) 193–198 (1978) [4 ref. Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

Glycyrrhizinic acid (GA) was determined in foods by the following method: extraction with 3% NH_4OH, clean-up by polyamide column chromatography, hydrolysis with 13% H_2SO_4 at 100°C, extraction with hot chloroform, methylation using diazomethane and gas chromatography of the GA methyl esters. Recovery rate was determined to be 82–101% for 1 or 2 mg GA added to the foods tested. 8 orange juice, 8 soy sauce, 8 soybean paste and 41 pickle samples were analysed for GA. The results showed: 2 soy sauce samples had 33 and 41 p.p.m.; 1 soy paste sample had 48 p.p.m.; 1 ginger pickle had 48 p.p.m.; 6 cucumber pickles had 20, 36, 48, 49, 60 and 172 p.p.m.; 1 shibazuke pickle had 31 p.p.m.; 6 takuanzuke pickles had 13, 17, 24, 39, 58 and 114 p.p.m.; 4 fukujinzuke pickles had 29, 33, 115 and 148 p.p.m.; and 3 other unnamed pickles had 20, 46 and 68 p.p.m. GA. LH

65

The microbiological purification of xylitol from mixtures of polyols prepared from hydrogenated *Pinus radiata* hydrolysates.
Bielby, R.; Gallagher, I. H. C.; Craig, J.
New Zealand Journal of Science 23 (2) 177–178 (1980) [4 ref. En] [Chem. Dep., Victoria Univ. of Wellington, PO Box 27007, Wellington, New Zealand]

By using the bacterium *Lactobacillus salivarius* subsp. *salicinius*, L-arabinitol was selectively fermented in artificial mixtures with xylitol, leading to a simple method for the recovery of xylitol in the crystalline state from spent culture supernatant. Specific metabolism of L-arabinitol was also demonstrated in a hydrogenated pentosan hydrolysate from *Pinus radiata*. Thus, preparation and microbiological purification of xylitol from readily available softwood pentosans is feasible on a laboratory scale and may be adaptable to commercial production. AS

66

The potential for natural and low calorie sweeteners. (In *'International sweetener & alcohol conference'* [see FSTA (1981) 13 6L386]) [Lecture]
Nicol, W. M.
pp. 70–75 (1980) [5 ref. En]

Sugar consumption is responsive to income growth to a per capita upper limit of 50–60 kg/yr. Below 15 kg/yr domestic utilization predominates; above 40 kg/yr food processing becomes the major outlet. Important functions of sucrose (in addition to sweetness) which render its replacement difficult in food manufacture are provision of bulk, lowering of water activity and effects on texture or crystal properties of some foods. Starch hydrolysates usually have a cost advantage and are likely to be the major competitors. The market for high intensity 'artificial' sweeteners having little or no calorific value is specialized and relatively small at 2–5% of the total sweetener market. Data are given on the relative sweetness and cost/unit of sweetness of various sugars, sugar alcohols and high intensity sweeteners. ELC

67

Xylose and xylitol metabolism, physiology and nutritional value.
Demetrakopoulos, G. E.; Amos, H.
World Review of Nutrition and Dietetics 32, 96–122 (1978) [158 ref. En] [Dep. of Microbiol. & Molecular Genetics, Harvard Med. School, 25 Shattuck Street, Boston, Massachusetts 02115, USA]

68

[Determination of Usal substitute sweetener in milk products.]
Prudel, M.; Davidkova, E.
Prumysl Potravin 31 (6) 329–330 (1980) [8 ref. Cs] [Vyzkumny Ustav Potravinarskeho Prumyslu, Prague, Czechoslovakia]

A method for detn. of Usal (aspartame) sweetener in milk products based on the amino acid analyser procedure used by Vesety et al. for soft drinks [FSTA (1980) 12 8H1242] is described. Measurement is carried out after removal of proteins from the products by acid precipitation, in the presence of an internal aspartame standard using the AAA 881 (Mikrotechna, Prague, Czechoslovakia) instrument. Recoveries of 95–100.5% of aspartame added at 0.03% to milk, cream, 'Polarka', 'Termix', yoghurt and other milk products and at 0.2% to dried milk were obtained. SKK

69

[Lactose hydrolysis by immobilized lactase.] [Review]
Baret, J.-L.
Industries Alimentaires et Agricoles 97 (10) 1051–1055 (1980) [5 ref. Fr, en]

Recent progress in lactose hydrolysis by immobilized lactase preparations is reviewed, including its application to various dairy by-products, utilization of the syrups produced, and economic implications (production costs and effects on the market for industrial sweeteners). RM

70

Analogs of the dipeptide sweetener L-aspartyl-L-phenylalanine methyl ester.
MacDonald, S. A.
Dissertation Abstracts International, B 41 (3) 964: Order no. 80-18787 (1980) [En] [Univ. of California, San Diego, California, USA]

Analogues of the title compound were prepared in which the central peptide bond was methylated, replaced by an ester bond, or reversed. None of the analogues had a sweet taste. Previously developed theories for correlating structure and taste of aspartate-based sweeteners do not consider the role of the central peptide bond and did not predict the taste of the analogues. Combining previous results with the present ones, structural requirements for sweet taste of aspartate-based sweeteners are identified as C-terminal zwitterionic ring, central unaltered amide, and a hydrophobic portion having the correct stereochemistry. DIH

71

Sweetening composition containing arabinogalactan.
Burge, M. L. E.; Nechutny, Z. L. A. Z. (Tate & Lyle Ltd.)
United States Patent 4 228 198 (1980) [En]

A sweetening composition comprises ≥1 sweetener selected from the group comprising the protein sweetener thaumatin, the protein sweetener monellin and saccharin, together with an amount of arabinogalactan to reduce sweetener after-taste. IFT

72

[Studies on analysis of saccharin in foods.]
Nakazato, M.; Nishijima, M.; Kanmuri, M.; Kan, K.; Ariga, T.; Ishikawa, F.; Fujinuma, K.; Naoi, Y.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 29 (1) 199–202 (1978) [2 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

A procedure for detn. of saccharin (as its *N*-methyl or *O*-methyl derivative) by GLC is described. Data are given for relative retention times of *O*-methylsaccharin, *N*-methylsaccharin, and various *p*-hydroxybenzoate and *p*-anisate esters, for 3 GLC columns: 5% OV-17 on Chromosorb W AW-DMCS 60–80 mesh, 5% SE-30 on Gaschrom Q 60–80 mesh, and 5% DEGS on Gaschrom Q 60–80 mesh. AJDW

73

[Saccharin purification.]
Daiwa Kasei KK
Japanese Examined Patent 5 535 092 (1980) [Ja]

Process is described in which saccharin is crystallized out of a conc. aqueous solution containing butyl acetate. IFT

74

[Survey of natural sweeteners. I. Determination of glycyrrhizic acid and stevioside in commercial natural sweetener products.]
Nakajima, I.; Hirokado, M.; Usami, H.; Mizoiri, S.; Endo, F.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 30 (1) 153–156 (1979) [7 ref. Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

Glycyrrhizic acid (GA) and stevioside (ST) were determined in 32 liquorice and stevia natural sweetener products, by HPLC and gas chromatography resp. Concn. of GA in liquorice products was 0.1–13.1%, and that of ST in stevia products was 1.1–8.3%, comprising 3–75% of the declared GA content and 32–83% of the declared ST content. [From En summ.] LH

75

[Rapid methylation of saccharin with diazomethane for gas chromatography.]
Kikuta, M.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] 54 (5) 337–339 (1980) [8 ref. Ja, en] [Ehime Prefectural Inst. of Public Health, Matsuyama 790, Japan]

For detn. of saccharin in foods by GLC, a rapid and quantitative technique for methylation of saccharin was studied using gaseous diazomethane with simple and convenient apparatus. The apparatus consists of 4 parts to generate diazomethane and methylate saccharin successively. Gaseous diazomethane generated by adding ethereal solution of *N*-methyl-*N*-nitroso-*p*-toluenesulfonamide to an ethanolic solution of potassium hydroxide was carried into an ethereal solution of saccharin by a stream of air saturated with ether. The reaction of saccharin and diazomethane using this procedure was rapid, and saccharin was quantitatively converted to volatile *N*-methyl and *O*-methyl derivatives. The ratio of *O*-methyl to *N*-methyl saccharin in the product was 17% consistently. AS

76

[Artificial sweetener.]
Daito KK
Japanese Examined Patent 5 529 664 (1980) [Ja]

Complex sweetening agent compositions contain dihydrochalcone and glycine, alanine and/or lysine for flavour improvement. IFT

77

Cell culture tumor promotion experiments with saccharin, phorbol myristate acetate and several common food materials.
Sivak, A.; Tu, A. S.
Cancer Letters 10 (1) 27–32 (1980) [16 ref. En] [Bio/Med. Sci. Section, Arthur D. Little, Inc., Acorn Park, Cambridge, Massachusetts 02140, USA]

In order to obtain additional information on the possible tumour-promoting potential of saccharin etc.,

the BALB/c-3T3 cell neoplastic transformation system was modified to examine the tumour promoting activity of a set of substances. Following initiation of the target cells with 3-methylcholanthrene, treatment of the cultures with phorbol myristate acetate (PMA, 0.01 μg/ml; 1.5×10^{-8}M) during the remainder of the 4-wk assay interval resulted in a marked increase in both spontaneous and initiated Type III transformed foci. In contrast, a similar treatment with saccharin at 20, 100 or 500 μg/ml (0.08, 0.4 or 2.1×10^{-3}M) did not influence the occurence of Type III transformed foci and did not result in a promoting response. Sodium ascorbate (2.53×10^{-3}M) and L-tryptophan (2.45×10^{-3}M) almost completely inhibited both spontaneous and initiated Type III transformed foci. Calcium pantothenate (2.10×10^{-3}M) exhibited a marginal promoting effect. Under the conditions of this study in which the classical tumour promoter PMA was highly active in promoting Type III transformed foci, saccharin was not active as either a direct transforming or promoting agent at doses up to 5 orders of magnitude higher. AS

78

[Use of the sweetening agent saccharin in foods.]
Sweden, Statens Livsmedelsverk
Statens Livsmedelsverks Meddelanden **M 8/80,** 1p. (1980) [Sv] [Statens Livsmedelsverk, Box 622, 751 26 Uppsala, Sweden]

Changes in Swedish legislation concerning use of saccharin in foods, which came into force on 1 Jan. 1981, are briefly summarized, with reference to prohibition of sale of chocolate or confectionery containing saccharin, prohibition of sale of other foods containing large quantities of saccharin, and amendments to labelling regulations for sweetener preparations containing saccharin. AJDW

79

Carbohydrate sweeteners: structural requirements for taste. [Review]
Lee, C. K.
World Review of Nutrition and Dietetics **33,** 142–197 (1979) [many ref. En] [Tate & Lyle Ltd., Philip Lyle Memorial Res. Lab., Univ. of Reading, Reading, Berks., UK]

Aspects discussed in this review on carbohydrate sweeteners are: the changing pattern of food consumption, structural relationship of sweetness of sugars, sucrose, structure-sweetness relationship in sucrose, chlorodeoxysucroses, fructose, structure-taste relationship in fructose, sugar alcohols (xylitol, sorbitol, maltitol), taste properties of sugar alcohols, corn sweetener products, glucose syrup, lycasin-hydrogenated glucose syrup, high fructose syrup, dihydrochalcone sweeteners and the structure-activity relationship, other glycosidic sweeteners containing (1→2)-linked disaccharides (stevioside, osladin, glycyrrhizin), and structure-activity relationship in the (1→2)-linked disaccharide sweeteners. AL

80

[Energy analysis for the raw materials for the competing sweeteners sucrose and isoglucose.]
Energieanalysen für Rohstoffe der konkurrierenden Süßungsmittel Saccharose und Isoglukose.
Fenner, –.
Berichte über Landwirtschaft **57** (3) 431–447 (1979) [27 ref. De, en, fr] [Lehrstuhl für Wirtschaftslehre des Landbaues, Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

Agricultural energy and capital costs of production of sugar beet are compared with those of production of potatoes, wheat and corn (raw materials for isoglucose production). Energy costs of production of raw materials (i.e. not including transport and subsequent into sweeteners) are as follows (kg sugar equivalent/GJ): sugar beet 210, potatoes 179, wheat 104, corn 83 (figures based on mean yield figures for the Federal Republic of Germany). Distribution of energy and capital costs among the production states drying, plant protection, fertilization, seed, and tractor fuel shows that corn, because of the energy intensive drying process necessary, would be the most adversely affected by future increases in fuel costs. DIH

81

Salts of dihydrochalcone sulfuric acids as sweeteners.
Crosby, G. A.; Weinshenker, N. M.; DuBois, G. E.
Australian Patent **507 535** (1980) [En]

Dihydrochalcone compounds, the ω-[3,5-dihydroxy-4(1-oxo-3(4-alkoxy-3-hydroxyphenyl)propyl)phenoxy]-1-alkanesulphonate salts of a physiologically acceptable cation are used as sweeteners in foods. The alkanesulphonic acid has n methylene groups, where n = 1–3, and the alkoxy substituent also contains 1–3 C atoms. W&Co

82

The effect of sodium saccharin in the diet on caecal microflora.
Anderson, R. L.; Kirkland, J. J.
Food and Cosmetics Toxicology **18** (4) 353–355 (1980) [5 ref. En] [Procter & Gamble Co., Miami Valley Lab., PO Box 39175, Cincinnati, Ohio 45247, USA]

The hypothesis that the ingestion of high doses of sodium saccharin may alter the intestinal microflora was tested by direct assay of the flora of the caecal contents obtained from male rats fed a diet containing either 7.5% sodium saccharin or no saccharin for 10 days. The presence of high saccharin content, about 90 mg/ml, in the caecal contents did not alter the total numbers of anaerobic microbes, but resulted in the deletion of a specific anaerobic microbe. Saccharin ingestion resulted in an increase in the number of aerobic microbes. It was also demonstrated that saccharin (≥ 50 mg/ml of medium) could reduce the amount of ammonia produced from urea by *Proteus vulgaris*. VJG

83

4,5-dimethyl-thieno[3,2-d]isothiazolo-3(2*H*)-one-1,1-dioxides, compositions, and methods of use as a sweetener.
Trummlitz, G.; Seeger, E.; Engel, W. (Boehringer Ingelheim GmbH)
United States Patent 4 233 333 (1980) [En]
The title compounds and their salts can be used as sweetening agents in foods and beverages, etc. RAW

84

Glucopyranosido-1,6-mannitol, a process for producing the same and it use as a sugar substitute.
Schiweck, H.; Steinle, G.; Müller, L.; Gau, W.; Munir, M. (Süddeutsche Zucker AG)
United States Patent 4 233 439 (1980) [En]
The title compound and a process for its preparation are described. The compound is obtained by catalytically hydrogenating neutral aqueous solutions of isomaltulose and cooling the hydrogenated solution. The use of the compound as a sugar substitute, as a sweetener for foods or beverages, and as a sweetened food composition is described. RAW

85

Artificial sweeteners.
F. Hoffmann-La Roche AG
British Patent 1 569 341 (1980) [En]
Process is described for the manufacture of artificial sweetening compositions based upon optically pure D-tryptophan and its derivatives RAW

86

Artificial sweeteners.
F. Hoffmann-La Roche AG
British Patent 1 569 342 (1980) [En]
See preceding abstract.

87

[Dominant lethal effects of saccharin sodium in ICR mice.]
Masubuchi, M.; Takahashi, A.; Takahashi, O.; Yoshida, S.; Ando, H.; Kubo, Y.; Hiraga, K.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 28 (2) 154–158 (1977) [6 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

88

[In vitro cytogenetic studies of artificial sweeteners (glycyrrhizinates, cyclamates, sorbitol, xylose, dulcitol) on cultured cell.]
Yoshida, S.; Masubuchi, M.; Hiraga, K.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 28 (2) 162–164 (1977) [8 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

89

[In vivo and in vitro chromosome aberrations induced by saccharin sodium.]
Masubuchi, M.; Nawai, S.; Yoshida, S.; Hiraga, K.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 28 (2) 149–153 (1977) [21 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

90

[Influence of saccharin impurities in inducing chromosome abnormalities.]
Masubuchi, M.; Nawai, S.; Hiraga, K.; Hirokado, M.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 28 (2) 159–161 (1977) [6 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]
Studies using CHO-K1 cells indicated that the genetic abnormalities observed in cells incubated with saccharin sodium could not be attributed to contamination with dimethylsulphoxide, *o*-sulphobenzoic acid, *o*-toluenesulphonamide or *p*-toluenesulphonamide. BWH

91

[Aspartam – a new kind of sweetener.]
Paccalin, J.; Lambert, J.; Lacomere, R.
Cahiers de Nutrition et de Dietetique 15 (1) 41–48 (1980) [53 ref. Fr, en] [Univ. de Bordeaux II, France]
A new sweetener, Aspartam, a dipeptide formed by association of 2 natural amino-acids, L-aspartic and L-phenylalanine, is recommended for its economic, therapeutic and medically prophylactic (obesity, cardiovascular disease) advantages. Its sweetening power is 180–200 × that of sucrose. In the intestine it rapidly hydrolyses to phenylalanine, aspartic acid and methyl alcohol, and in tests it has proved heat stable (only 5% degradation after 70 h at 105°C). 177 persons (aged 12–80), given 2 to 15 (mean 5) × 20 mg (equivalent to 4 g sugar) Aspartam tablets for 3–15 months were examined medically every 2 months; some were simultaneously taking anti-diabetic or tranquillizing drugs. The majority considered the product identical to sugar in taste, although proportionately slightly less sweet, and reported no bitter after-taste. There were no signs of clinical intolerance, no adverse effects on blood, kidneys or liver were observed, and other medication was unaffected. The only contraindication is in the case of phenylketonuria. KME

92

[Glycyrrhizic taste improvement.]
Sanyo Kokusaku Pulp
Japanese Examined Patent 5 537 224 (1980) [Ja]
The flavour of glycyrrhizic acid compositions is improved by the addition of stevioside mother liquor. IFT

93

Artificial sweetener.
Tate & Lyle Ltd.
UK Patent Application 2 041 209A (1980) [En]

Heat stable sweetening composition for use in hot food and beverages, e.g. tea, coffee etc., contains a peptide sweetener, e.g. thaumatin, and gelatin at wt. ratio gelatin/sweetener of <100:1. RAW

94

[Legal application of sweeteners and sugar substitutes in canned products, especially canned fruits and vegetables.] Rechtliche Möglichkeiten über den Einsatz von Süssstoffen und Zuckeraustauschstoffen in Konserven unter besonderer Berücksichtigung von Obst- und Gemüsekonserven.
Bungard, D.
Industrielle Obst- und Gemüseverwertung **65** (16) 419–425 (1980) [37 ref. De] [Bergstrasse 31, 5208 Eitorf (Sieg), Federal Republic of Germany]

Federal Republic of Germany legislation on synthetic sweeteners and sugar substitutes (e.g. fructose, mannitol, sorbitol, xylitol) is surveyed, with details on applications and labelling. Examples given of combined use of vinegar (or essence or acetic acid) with saccharin include delicatessen salads, marinated fish, mayonnaise, horseradish, canned pickles and mustard. RM

95

Specification for sodium saccharin, food grade (1st revision).
India, Indian Standards Institution
Indian Standard **IS 5345,** 13pp. (1978) [En]

This standard prescribes the general requirements and methods of sampling and testing food grade sodium saccharin, used as a non-nutritive sweetener. It also covers chemical names and formulae, packaging and storage. Specific requirements include: purity as $C_7H_4NNaO_3S$ (after drying at 120°C for 4 h), 99–101%; moisture, <15% by mass; toluenesulphonamides, <100 mg/kg; Pb, <10 mg/kg; arsenic, <2 mg/kg; and Se, <30 mg/kg. 1 g sodium saccharin shall be soluble in 1.2 ml distilled water or in 50 ml ethyl alcohol (95%). An appendix lays down test methods, including reagents and procedure, for detn. of moisture, acidity and alkalinity, for benzoate and salicylate, readily carbonizable substances, toluenesulphonamides (2 methods, viz. gas chromatography and TLC), and Se. A list of 35 Indian standards on food additives is appended. KME

96

Specification for calcium saccharin, food grade (1st revision).
India, Indian Standards Institution
Indian Standard **IS 5709,** 8pp. (1978) [En]

This standard prescribes the general requirements and methods of sampling and testing food grade calcium saccharin, used as a non-nutritive sweetener. It also covers chemical names and formulae, packaging and storage. Specific requirements include: purity as $C_{14}H_8CaN_2O_6S_2$ (on dry basis), >95% by mass; moisture, <15% by mass; toluenesulphonamides, <100 mg/kg; Pb, <10 mg/kg; arsenic, <2 mg/kg; and Se, <30 mg/kg. An appendix lays down the test methods for calcium saccharin, including reagents and procedure, and for detn. of moisture. 1 g of calcium saccharin shall be soluble in 1.5 ml distilled water or in 33 ml ethyl alcohol (95%). KME

97

Specification for saccharin, food grade (1st revision).
India, Indian Standards Institution
Indian Standard **IS 6385,** 9pp. (1978) [En]

This standard prescribes the requirements and methods of sampling and testing food grade saccharin, used as a non-nutritive sweetener. It also covers chemical names and formulae, packaging and storage. 1 g of saccharin shall be soluble in 290 ml of distilled water at 25°C, in 25 ml of boiling water (pH 6.8–6.9), and in 30 ml of ethyl alcohol (95%). It shall be slightly soluble in chloroform and in ether, and readily dissolved by dilute solutions of ammonia, solutions of alkali hydroxides, and in solutions of alkali carbonates. Specific requirements include: purity as $C_7H_5NO_3S$ (on dry basis), >98% by mass; moisture (by mass on drying at 105°C for 2 h), <1.0%; sulphated ash, <0.2% by mass; toluenesulphonamide, <100 mg/kg; Pb, <10 mg/kg; arsenic, <2 mg/kg; and Se, <30 mg/kg. An appendix lays down 2 test methods for detn. of purity of saccharin, and tests for benzoic and salicylic acid, sulphated ash and detn. of toluenesulphonamides. KME

98

Extraction of thaumatin.
Daniels, M. J.; Higginbotham, J. D. (Talres Development (NA) NV)
United States Patent 4 221 704 (1980) [En]

A process for the extraction of the protein sweetener thaumatin from the fruit of the tropical plant *Thaumatococcus danielli*, comprises the steps of skinning the fruit, drying the pulp and mechanically separating the arils from the remainder of the fruit, powdering or otherwise comminuting the dried aril and extracting the resultant powder with water in the absence of added salts while maintaining the pH in the range 2.0 to 4.5. The skinned fruit is preferably freeze-dried. EJM

99

Fructose sweetens Batter-Lite's fortunes.
Hollingsworth, P.; Wilson, C.
Processed Prepared Food 149 (2) 63–66 (1980) [En]

A description is given of the development of Batter-Lite Foods Inc., Beloit, Wisconsin from its commencement in 1974 to its present positions as the largest US processor of dietetic products using fructose as a sweetening agent. Production began with Batter-Lite dietetic cake mix, but now SweetLite liquid fructose, tablets and granular sweetener comprise approx. 40% of sales. Batter-Lite brand cake and cookie mixes account for 30%, and all other products ranging from jams to cookbooks account for another 30%. VIG

100

Effect of sweetener types on quality and composition of canned kiwi nectars.
Wildman, T.; Luh, B. S.
Journal of Food Science 46 (2) 387–390 (1981) [13 ref. En] [Dep. of Food Sci. & Tech., Univ. of California, Davis, California 95616, USA]

Effect of sweetener types [sucrose, sucrose/corn syrup solids, and sucrose/corn syrup solids/high fructose corn syrup solids] and citric acid on quality and composition of canned kiwi fruit nectars was investigated. Objective measurements with a Brookfield viscosimeter indicate that the consistency of the nectars changed very little with sweetener type. HPLC was used to determine the various oligosaccharides [fructose, glucose, sucrose, maltose] in the nectars. Sensory evaluation of the canned nectars indicates that the sweetener types and citric acid cause some differences in sweetness scores. The panel did not find significant difference in flavour between the nectars made with sucrose and those made with other combinations. IFT

101

The range of sweeteners. [Lecture]
Hugill, J. A. C.
IFST Proceedings 13 (4) 251–262 (1980) [En]

Present hypotheses relating molecular structure to taste are briefly discussed, the types of sweetener available are classified, and reasons for development of non-sucrose sweeteners are identified. Individual sweeteners (sugars, polyalcohols, non-nutritive sweeteners) that are used, or have been considered for use, in foods are then surveyed, with brief details of taste and other properties and economics of use being given for 5 sugar alcohols, 6 synthetic non-nutritive sweeteners, and 8 naturally occurring non-nutritive sweeteners. [See FSTA (1981) 13 9A546.] DIH

102

Carbohydrates as chemical feed-stocks.
Khan, R.; Forage, A. J.
Sugar Technology Reviews 7 (3) 175–196 (1980) [28 ref. En, es] [Philip Lyle Memorial Res. Lab., Tate & Lyle Ltd., Reading Univ., Reading, UK]

The increasing cost of petroleum and uncertainty about future supplies is leading the chemical industries to investigate alternative raw materials, especially natural regenerable products. New technologies for production of food, chemicals and energy are likely to create vast industrial changes, including reduced utilization of sugar for food (but alternative markets for primary carbohydrate producers). Of the possible agricultural crops, sugar and starches are available at considerably lower prices than petroleum, and supplies could be increased without difficulty. Given more development work, most basic organic chemicals now made from petroleum could be produced from sugar. Available raw material supplies with possible products and production costs of new processes are reviewed, based on (i) chemical degradation, (ii) chemical synthesis from sucrose and (iii) fermentation processes. (i) based on sucrose or glucose could produce a range of organic chemicals, plus fructose and sorbitol for food use. (ii) processes include production of sucrose fatty acid esters forming the basis of resins and plastics now derived from petroleum, but also new high intensity sweeteners, particularly chloro derivatives of galactosucrose (200 × sweeter than sucrose). The wide range of industrial, pharmaceutical and food products obtainable from carbohydrates by (iii) is reviewed; the most significant present development is the production of industrial and fuel (in addition to food) alcohol from molasses, cane juice and starch hydrolysate. ELC

103

Cake compositions containing high fructose corn syrup.
Hartnett, D. I. (ICI Americas Inc.)
United States Patent 4 250 202 (1981) [En]

Suitable cakes can be made where 100% of the sucrose normally employed is replaced by a blend of a high fructose corn syrup/corn syrup as sweetening agent. Mono and diglycerides of fat-forming fatty acids and ethoxylated sorbitan monostearates are used in the presence of a single stage non-nucleating leavening agent, such as sodium aluminium phosphate, in addition to usual cake ingredients. AS

104

[Fermented milk and sweeteners.] [Review]
Kannabe, M.
New Food Industry [Nyu Fudo Indasutori] 21 (9) 2–7 (1979) [19 ref. Ja] [Res. Lab., Meiji Nyugyo KK, Japan]

This review article outlines and compares the sweetening properties of sucrose, glucose, fructose, maltose, glycyllysine and sorbitol and their suitability for use in yoghurt and fermented drinks. The use of liquid sugars and honey (used in Japan since the 1940's), in yoghurt is mentioned. The effect of sugars on acidity and aroma development during fermentation, stabilization of sterile lactic drinks and maintenance of lactic acid bacteria, and the changes in sugars during product storage are also discussed. BWH

105

Non-nutritive sweetening agents. [Lecture]
Lindner, K.
Bibliotheca 'Nutritio et Dieta' No. 29, 82–88 (1980) [5 ref. En] [Coll. of Commerce & Catering, Alkotmany utca 9–11, Budapest V, Hungary]

Non-nutritive sweeteners currently available are: saccharin, cyclamates, aspartame, D-6-chlorotryptophan, miraculin, monellin, thaumatin and the dihydrochalcones and glycyrrhizin. The technological (stability, physical characteristics, etc.) and toxicological status of these sweeteners is briefly discussed. The sweetener CH-401 [see FSTA (1978) 10 6T202, 6T203], a dihydrochalcone compound, is described in some detail. It is a stable, apparently non-toxic compound, with a sweetening power 1000–1500 times that of sucrose in aqueous solution, and tests with a sensory panel have shown that it is appropriate for sweetening sour-tasting beverages and some fruit products. [See FSTA (1981) 13 9C296.] JRR

106

[Quantitative determination of saccharin and cyclamate in non-alcoholic beverages.] Quantitative Bestimmung von Saccharin and Zyklamat in alkoholfreien Erfrischungsgetränken.
Krüger, G.
Lebensmittelindustrie 27 (6) 264–266 (1980) [28 ref. De, en, ru, fr] [Inst. für die Gärungs- & Getränkeind. VEB Kombinat Spirituosen, Wein Sekt, Berlin]

A procedure for detn. of saccharin in soft drinks is described, based on elimination of caffeine from a degassed sample by extraction with chloroform, separation of preservatives by addition of citric acid + $MgSO_4$ followed by steam distillation, extraction of saccharin from the distillation residue with a diethyl ether/methanol (9:1 v/v) mixture, re-extracted into 1% Na_2CO_3 solution, and determined by spectrophotometry at 235 and 244 nm against a Na_2CO_3 blank. Recovery is generally 85–98%. A procedure for detn. of cyclamate in soft drinks for diabetics is described, based on treatment of the sample with NaOCl, extraction of cyclamate with cyclohexane, shaking the cyclohexane extract with 0.5N NaOH, washing the separated cyclohexane phase with distilled water, and detn. of cyclamate in the cyclohexane phase by spectrophotometry at 314 nm against pure cyclohexane. Recovery is 97.9–99.3%. Both methods give acceptable s.d. for routine use. IN

107

Process for recovering xylitol from end syrups of the xylitol crystallization.
Munir, M.; Schiweck, H. (Süddeutsche Zucker AG)
United States Patent 4 246 431 (1981) [En]

Process is described for extracting xylitol from the end syrups of xylitol crystallization by subjecting the end syrup to chromatographic separation, the syrup being degraded into ≥2 fractions, the 1st fraction containing mainly polysaccharides and polysaccharide alcohols, and the subsequent fractions mainly containing the pentitols and hexitols. AS

108

[Application and determination of sweeteners and sugar substitutes, especially in canned products.] Beitrag zur Anwendung und Analytik von Süssstoffen und Zuckeraustauschstoffen unter besonderer Berücksichtigung von Konserven.
Kreutzig, L.
Industrielle Obst- und Gemüseverwertung 65 (22) 591–594 (1980) [22 ref. De] [Chem. Untersuchungslab., Frankfurter Strasse 60, 3500 Kassel, Federal Republic of Germany]

Properties, applications, detection and quantitative detn. of the following synthetic sweeteners and sugar substitutes are described: saccharin and its sodium salt, sodium cyclamate, fructose and sorbitol. Purity requirements demanded by German food legislation are briefly mentioned. RM

109

Chewing gum.
General Foods Corp.
UK Patent Application 2 046 568A (1980) [En]

Chewing gum contains the methyl ester of L-aspartyl-L-phenylalanine as a sweetening agent and has pH 5–7 to minimize the formation of diacetopiperazine during storage. IFT

110

New dairy processes using lactose.
Gregory, K.
Food Processing Industry 49 (589) 44–46 (1980) [En] [John & E. Sturge Ltd., Wheeleys Road, Birmingham B15 2LE, UK]

The potential use of hydrolysed lactose as a sweetener in dairy and other food products is discussed. The properties of the yeast lactase Hydrolact, which make it ideally suited for the hydrolysis of lactose in milk and sweet whey, are considered. Application of yeast lactase to the production of ice cream on a laboratory scale using lactose hydrolysed milk is described. VJG

111

[Process for the manufacture of sour-milk cheeses and similar.] Verfahren zum Herstellen von Sauermilchkäsen u. dgl.
Zscheyge, W. (F. Th. William Zscheyge Zscheyge-Chemie & Molkerei-Chemie)
German Federal Republic Patent Application 2 912 778 (1980) [De]

The feature of this process for the manufacture of sour-milk cheese, cooked cheese, processed cheese, cheese products, etc. is that sugar alcohols are added to partially or fully replace the conventional additives, e.g. citrates and phosphates, normally used in these products. Xylitol, sorbitol or mannitol are suitable sugar alcohols and are added at 2–4% in sour-milk cheeses manufacture, and in appropriate amounts to replace about 85% emulsifying salts in processed cheese and 88% in cooked cheese. It is claimed that the process improves the consistency and flavour of the products. FL

112

[Stevia sweetening agent]
Sanyo Kokusaku Pulp
Japanese Examined Patent 5 547 871 (1980) [Ja]

Stevia sweetening agents are purified by contact with a non-polar synthetic adsorbent, followed by elution and treatment with calcium hydroxide and ion exchange. IFT

113

Effect of photoperiod on flowering and stevioside content in plants of *Stevia rebaudiana* Bertoni.
Zaidan, L. B. P.; Dietrich, S. M. C.; Felippe, G. M.
Japanese Journal of Crop Science [Nihon Sakumotsu Gakkai Kiji] 49 (4) 569–574 (1980) [13 ref. En] [Secao de Fitoecologia, Inst. de Botanica, Sao Paulo, Caixa Postal 4005-01000-Sao Paulo, Brazil]

S. rebaudiana, an endemic Paraguayan herb whose leaves are a source of a sweetener, was subjected to 8 h of natural daylight, or up to 16 h with complementary incandescent light (240 lux), for a study of the effects of photoperiod on flowering and stevioside (the sweetening substance) content. Stevioside was separated using organic solvents, crystallized and subjected to descending paper chromatography for identification. Appearance of developed flowers did not significantly decrease stevioside content, vegetative plants containing 6.88 and flowering plants 6.05% stevioside on a dry wt. basis. Stevioside could be extracted from leaves (6.88%) and inflorescence (2.72%), but not initially from stem and root, although careful study revealed low concn. of stevioside in the stem. Leaves of plants grown under natural conditions but short days contained very increased levels (up to 375% increase) of stevioside compared to those grown in greenhouses with 8 h illumination. Leaves of various var. were also compared for stevioside content on short day conditions, and for the most suitable photoperiod. LH

114

[Research on new sweeteners.]
Higginbotham, J. D.
Fruits 35 (11) 709–713 (1980) [Fr, de, en, es, ru] [Philip Lyle Memorial Res. Lab., Reading, Berks., UK]

This article discusses various non-sugar sweeteners including monellin from *Dioscoreophyllum comminsii* and a sweet protein extract from *Thaumatococcus danielli*, as well as recent work on trichlorogalacto sucrose which has exactly the same taste as sucrose but has a lower calorific value and does not cause dental caries. RM

115

Non-cariogenic sweetener.
Hayashibara Seibuts
UK Patent Application 2 046 757A (1980) [En]

Non-cariogenic sweeteners for foodstuffs comprise fructosides prepared by the action of levan sucrase. IFT

116

[New synthetic sweeteners. Preparation of terpenoid sulphamates.]
Evangelisti, F.; Bargagna, A.; Schenone, P.
Rivista della Societa Italiana di Scienza dell'Alimentazione 9 (6) 435–436 (1980) [9 ref. It, en] [Istituto Policattedra di Sci. Farmaceutiche, Univ. di Genova, Genoa, Italy]

Studies on synthesis of terpenoid sulphamates of potential use as non-nutritive sweeteners, from mono- or bicyclic terpenoid amines are described: data on m.p., yield, structure etc. are presented for derivatives prepared from menthylamine, fenchylamine, bornylamine, isobornylamine, *cis*-6-amino-1,3,3-trimethyl-2-oxybicyclo[2,2,2]octane, and *exo*-2-norbornylamine. Of all the sulphamates tested, only the sodium salt derived from *exo*-2-norbornylamine was sweet, having a sweetness 100 times greater than that of sucrose. The relationship of structure to sweetness in terpenoid sulphamates is briefly considered. AJDW

117

Cyclamate (cyclamic acid, calcium cyclamate, and sodium cyclamate), Commissioner's decision.
United States of America, Food & Drug Administration
Federal Register 45 (181, Sept. 16) 61474–61530 (1980) [En] [Washington, DC, USA]

Evidence regarding carcinogenecity and mutagenicity of the artificial sweetener cyclamate is extensively reviewed. On the basis of the evidence, cyclamate has not been shown not to cause cancer or heritable genetic damage. Therefore, under the Federal Food, Drug, and Cosmetic Act, cyclamate has not been shown to be safe for its proposed use as a food additive and approval is denied. CAS

118

[Changes during storage of opaque apple juice sweetened with unconventional sweeteners.]
Veränderungen in mit nicht traditionellen Süssungsmitteln gesüsstem trüben Apfelsaft während der Lagerung.
Drdak, M.; Oravcova, V.; Jurkovicova, M.
Industrielle Obst- und Gemüseverwertung 66 (2) 31–35 (1981) [9 ref. De] [Chem. Tech. Fak. SVST, Bratislava, Czechoslovakia]

Changes in naturally opaque apple juice prepared with sucrose, D-xylose or xylitol were observed during 3 months' storage at 20°C or 2 months (63 days) at 37°C. Tables and diagrams show the changes in concn. of hydroxymethylfurfural (HMF), water-soluble pigments (determined at 420 nm), ascorbic acid concn., and juice colour (instrumental and organoleptic evaluation). Much lower HMF concn. were found in samples prepared with xylitol than with sucrose, both immediately after preparation and during storage. (No HMF detn. was possible in samples prepared with xylose.) Ascorbic acid retention was highest in samples prepared with xylitol, followed by sucrose and xylose, and was higher at the lower storage temp. Detn. of water-soluble pigments (a measure of non-enzymic browning) and of juice colour also gave best results with xylitol and worst results with xylose but none of the differences were sufficiently significant to affect the use of the 2 sugar substitutes. RM

119

[The Südzucker handbook of non-alcoholic beverages. Revised Supplement 4.] Das Südzucker Handbuch: alkoholfreie Erfrischungsgetränke. 4. Austauschlieferung. [Booklet]
Südzucker-Verkauf GmbH
55pp. (1980) [De] Oberursel, Federal Republic of Germany

This revised supplement to this loose-leaf handbook comprises section 1:3, Other sweeteners (30pp.), covering starch saccharification products (including high-fructose syrups), sorbitol, fructose, sorbose, lactose, xylitol, lactitol, maltitol, isomaltitol, saccharin, cyclamates and other sweeteners; and section 4:4, Labelling of soft drinks in accordance with legal requirements (25pp.), covering general requirements, product-specific requirements, nutritional labelling, filling vol. requirements, and labelling of multipacks and containers. [See also preceding abstr.] AJDW

120

Quantitative production of xylitol from D-xylose by a high-xylitol producing yeast mutant of *Candida tropicalis* (H × P2.).
Gong, C. S.; Chen, L. F.; Tsao, G. T.
Biotechnology Letters 3 (3) 125–130 (1981) [10 ref. En] [A. A. Potter Eng. Cent., Purdue Univ., W. Lafayette, Indiana 47907, USA]

Xylitol, a naturally occurring sweetener which may be used as a sugar substitute in cases of diabetes or glucose-6-phosphate dehydrogenase deficiency, was produced as a metabolic by-product by a number of yeasts grown on a medium containing D-xylose as C and energy sources. Among yeast strains tested, the mutant strain *C. tropicalis* H × P2 produced xylitol from D-xylose with a yield of >90% under aerobic conditions. RM

121

[Oligo sugar productions.]
Hayashibara, K.
Japanese Examined Patent 5 539 304 (1980) [Ja]

Process is described in which liquified starch is mixed with sucrose and/or fructose, and the mixture is treated with α-amylase to give an oligo sugar, containing terminal fructose linkages, which is useful as a sweetening agent in the preparation of fooostuffs or beverages. IFT

122

[Determination of sugar alcohols in chewing gum by gas chromatography.] Bestimmung von Zuckeralkoholen in Kaugummi mittels Gaschromatographie.
Oesterhelt, G.; Vecchi, M.; Rueher, R.; Manz, U.
Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 71 (4) 419–426 (1980) [9 ref. De, en, fr] [Forschungsabteilungen der F. Hoffman-La Roche & Co. AG, Basel, Switzerland]

2 methods are described for detn. of xylitol, mannitol and sorbitol in chewing gums. In the 1st method polyalcohols are extracted from comminuted chewing gum with water, and the dried extract is derivatized for GLC analysis. Procedures for preparation of trimethylsilyl (TMS) or acetyl derivatives are given. TMS derivatives are analysed using columns packed with 5% OV-17 on Gaschrom Q or deactivated Chromosorb W-AW, or on glass capillary columns coated with OV-17. Acetyl derivatives are detected on packed columns containing 10% Silar 10 C on deactivated Chromosorb W-AW. A more rapid method is described wherein comminuted chewing gum is extracted directly with the trimethylsilylating or acetylating agent in an ultrasonic bath. Mannitol and sorbitol are generally only reliably separated as acetyl derivatives, trimethylsilylation is however more reproducible, and 80% separation of the 2 TMS derivatives was possible on a 3.5 m packed OV-17 column. Commercial chewing gums were analysed using both methods and both types of derivatization, results are tabulated. Analysis of TMS derivatives was preferred to that of acetyl derivatives because of lower variation; complete separation of mannitol and sorbitol TMS derivatives was possible on a capillary OV-17 column (40 m); very low amounts of mannitol could be determined with short analysis times. DIH

123

[Sugar-free confectionery mass with a base of xylitol and sorbitol.] Zuckerfreie Süsswarenmasse auf der Grundlage von Xylit und Sorbit.
Andersen, G. (August Storck KG)
German Federal Republic Patent Application 2 912 411 (1980) [De]

Method is described for manufacture of a sugar-free confectionery product, containing ≥1 original sugar-free material, e.g. carrageenans, pectins, alginates etc. The confectionery product can be used in the manufacture of boiled sweets and caramels, liquorice products, etc. The product can contain 20–50 wt.% sugar free material, 20–35 wt.% xylitol, 0.1–4 wt.% water, 0.1–5 wt.% aroma and flavour compounds, acids and/or colorants, the remainder being sorbitol. W&Co.

124

Carbohydrate sweeteners in foods and nutrition. [Book]
Koivistoinen, P.; Hyvönen, L. (Editors)
xiv + 289pp. ISBN 0-12-417050-1 (1980) [many ref. En] London, UK; Academic Press, Inc. (London) Ltd. Price £19.40; $47.00 [Univ. of Helsinki, SF – 00710 Helsinki 71, Finland]

This publication covers papers presented at a symposium on carbohydrate sweeteners, held in Helsinki-Espoo, Finland, from Nov. 29–Dec. 1, 1978. Chapters are: Natural and added sweet carbohydrates in foods and diets, by G. Frostell (pp. 1–14, 23 ref.). Carbohydrate sweeteners in metabolism and diseases, by R. H. Ylikahri & R. Pelkonen (pp. 15–35, 88 ref.). Sweeteners and dental caries, by A. Scheinin (pp. 37–44, 35 ref.). Sweeteners in nutrition policy, by A. Bruce (pp. 45–59, 10 ref.). Theory of sweetness, by G. G. Birch (pp. 61–75, 24 ref.). Psychophysiology of sweetness, by G. Hellekant (pp. 77–85, 23 ref.). A critical analysis of sensory responses to sweetness, by R. M. Pangborn (pp. 87–110, 47 ref.). Consumer behaviour in relation to sweetness of food, by R. Prättälä, L. Räsänen & A. Ahlström (pp. 111–125, 32 ref.). Comparative evaluation of carbohydrate sweeteners, by G. von Hertzen & C. Lindqvist (pp. 127–149, 54 ref.). Sucrose in food systems, by W. M. Nicol (pp. 151–162, 4 ref.). Modification of sweetness by food environment, by P. Koivistoinen & L. Hyvönen (pp. 163–171, 38 ref.). Synergism between sweeteners, by L. Hyvönen (pp. 173–184, 16 ref.). Sugars in thermal processes, by O. Theander (pp. 185–199, 17 ref.). Sugars in food fermentation processes, by L. Kjaergaard (pp. 201–211, 14 ref.). Starch hydrolysates: improved sweeteners obtained by the use of enzymes, by E. Berghmans & N. H. Aschengreen (pp. 213–224). Lycasin hydrogenated hydrolysates, by E. Rockström (pp. 225–232, 3 ref.). Lactose hydrolysates, by M. Harju & M. Kreula (pp.

233–242, 43 ref.). Lactitol, by P. Linko, T. Saijonmaa, M. Heikonen & M. Kreula (pp. 243–257, 34 ref.). Fructose: the rationale for traditional and modern uses, by T. Doty (pp. 259–268, 21 ref.). Xylitol properties and applications in foods and pharmaceuticals, by F. A. Voirol (pp. 269–285, 31 ref.). A 3-pp. subject index is also provided. LH

125

Chewing gums of improved sweetness retention.
Klose, R. E.; Bahoshy, B. J.; Sjonvall, R. E.; Yeransian, J. A. (General Foods Corp.)
United States Patent 4 246 286 (1981) [En]

A sweetened chewing gum composition contains ≤1.5% by wt. of total product of L-aspartyl-L-phenylalanine ethyl ester (APM). The improvement comprises a gum with pH 5.0–7.0 so that the degradation of APM to diketopiperazine is minimized and the storage stability of the gum is greatly increased. RAW

126

[Additives, sugars and sweeteners.] Repetitorium, Kurzes und Bündiges über einige Zusatz- und Hilfsstoffe, Zuckersorten und Süssmittel.
Schreiber, P.
Kakao und Zucker 32 (8) 166, 168–169, 173 (1980) [De]

Brief discussions are given of various confectionery additives and ingredients, including ethyl vanillin, liquorice, glucose, xylitol, honey, lactose, gelatin, menthol, and sugar/pectin/edible acid blends; types of nougat and their composition are also considered. AJDW

127

Sweetening agent.
Asahi Chemical Industries KK
Japanese Examined Patent 5 546 699 (1980) [En]

The bitter taste of dihydrochalcone sweeteners is reduced by incorporation of 5'ribonucleotide. IFT

128

[Studies on the metabolism of food additives by microorganisms inhabiting the gastrointestinal tract. V. Detection of cyclohexylamine-forming bacteria from the intestinal tract of rabbit and guinea pig after oral administration of sodium cyclamate.]
Matsui, M.; Hayashi, N.; Konuma, H.; Tanimura, A.; Kurata, H.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 21 (2) 129–140 (1980) [19 ref. Ja, en] [Nat. Inst. of Hygienic Sci., 18-1, Kamiyoga 1-chome, Setagaya-ku, Tokyo, Japan]

129

[Artificial sweetener.]
Sun Star Hamigaki KK
Japanese Examined Patent 5 546 695 (1980) [Ja]

Process is described in which *Hydrangea serrata*, stevia or licorice is subjected to solvent extraction with glycerol, sorbitol or propylene glycol to give sweeteners. IFT

130

[Sugar substitutes for use in confectionery and bakery products for diabetics.] Zuckeraustauschstoffe für Diabetiker-Süsswaren und Backerzeugnisse.
Schreiber, P.
Kakao und Zucker 32 (6) 118–119 (1980) [De]

The use of sorbitol, xylitol, manitol and fructose as substitutes for sucrose in confectionery and bakery products for diabetics is discussed, with reference to the physicochemical, metabolic and technological characteristics and sweetness of these compounds, and labelling requirements for products for diabetics. AJDW

131

Gas chromatography in food analysis.
Boniforti, L.; Lorusso, S.
Ernährung 5 (2) 68–73 (1981) [En] [Istituto Superiore di Sanita, 00161 Rome, Viale Regina Elena 299, Italy]

A review is given of applications of gas chromatography in various branches of the food industry, including the detn. of sugars, artificial sweeteners, and emulsifiers and stabilizers, e.g. sucrose diacetate hexaisobutyrate. References are available from the authors. MEC

132

Effect of xylitol on some food-spoilage microorganisms.
Mäkinen, K. K.; Söderling, E.
Journal of Food Science 46 (3) 950–951 (1981) [4 ref. En] [Dep. of Biochem., Inst. of Dentistry, Univ. of Turku, SF-20520 Turku 52, Finland]

The effect of 0.5% xylitol, 0.5% glucose, and their mixture on growth and pH of cultures of 6 food-spoilage microorganisms was studied. 0.5% xylitol inhibited most potently the growth of *Clostridium butyricum* and *Lactobacillus bulgaricus*, strongly retarding production of acid by these organisms. 0.5% xylitol also inhibited the growth of *Saccharomyces cerevisiae*, *Escherichia coli*, and *Salmonella typhii*, but not that of *Aspergillus flavus*. Less inhibition was observed with the sugar mixture than with 0.5% xylitol alone. [U-^{14}C]xylitol was not taken up by the cells during growth. Combined with the advantageous organoleptic and physiological properties of xylitol, the present results suggest that xylitol may be of value in the preservation of certain foods. IFT

133

[The baking technological importance of various sugars.] Die backtechnische Bedeutung der Zuckerarten.
Ludewig, H.-G.
Brot & Backwaren 29 (3) 50–52 (1981) [3 ref. De]

The baking-technological characteristics of various sugars used in the manufacture of fine bakery products are described. Sugar solubility (°Brix; g sugar/100 g sugar solution) at 20°C in water was: fructose, 79; sorbitol, 69, sucrose, 67; invert sugar, 66; xylitol, 63; glucose, 47; and lactose, 19. The organoleptic sweetness degree at 20°C of the following sugar solutions and sweeteners are tabulated: fructose, sucrose, dextrose, sorbitol, glucose syrup, maltose, lactose, invert sugar, sodium cyclamate and saccharin. The importance of the various sweetening substances is discussed, regarding viscosity of whipped masses, moisture equilibrium, hygroscopicity, fermentability by bakers' yeast, and effects on browning of fine bakery products. IN

134

Students opt for shakes containing less sweetener.
Anon.
Dairy Field 163 (7) 36 (1980) [En]

Tests conducted in 2 high school lunch cafeterias showed that milk shakes containing only 6% sweetener vs. 11% found in many commercially available products were very acceptable. A typical formulation contains 3.25% milk fat, 11% milk SNF, 5% sweetener, 1% cocoa powder, 0.3% stabilizer and 12 ml vanilla/gal. The advantage of these milk shakes is a significant reduction in calorie content compared to most commercial shake formulations now available to the public. FL

135

Preparing neohesperidin dihydrochalcone sweetener composition.
Dwivedi, B. K.; Sampathkumar, P. S. (Chimicasa GmbH)
United States Patent 4 254 155 (1981) [En]

Neohesperidin dihydrochalcone-based sweetener composition comprises neohesperidin dihydrochalcone, a water-soluble organic, polyhydroxy carrier and (optionally) a taste modifier; the composition has an acidic pH and is a water-soluble, nondiscoloring composition which has reduced or is devoid of undesirable lingering aftertaste properties. AS

136

Sweeteners – a review. [Review]
Inglett, G. E.
Food Technology 35 (3) 37–38, 40–41 (1981) [39 ref. En] [N. Reg. Res. Cent., USDA, 1815 N. University Street, Peoria, Illinois 61604, USA]

Aspects relating to various types of sweetener are reviewed, including sources, manufacture, composition, properties and applications. The sweeteners covered are: natural sweeteners (sucrose, corn sweeteners, high-fructose corn syrups); sweet polyhydric alcohols (e.g. sorbitol, mannitol, maltitol, xylitol); intense sweeteners of natural origin (phyllodulcin obtained from the dried leaves of *Hydrangea macrophylla* Seringe var. *Thunbergii* Makino, stevioside from the leaves of *Stevia rebaudiana*, glycyrrhizin from the roots of *Glycyrrhiza glabra*, osladin from the rhizomes of *Polypodium vulgare* L., and a triterpenoid glycoside from dried Lo Han fruit, *Momordica grosvenori*); protein sweeteners from the miracle fruit (*Synsepalum dulcificum*), from serendipity berries (*Dioscoreophyllum cumminsii* Diels) and from katemfe (*Thaumatococcus danielli*); and synthetic sweeteners (peptide-based sweeteners such as aspartame, dihydrochalcone sweeteners, acesulfame-K which is the potassium salt of a derivative of acetoacetic acid, and aldoxines and their analogues). JA

137

Stability of α-L-aspartyl-L-phenylalanine methyl ester hydrochloride in aqueous solutions.
Prudel, M.; Davidkova, E.
Nahrung 25 (2) 193–199 (1981) [8 ref. En, de, ru] [Res. Inst. of Food Ind., Prague, Czechoslovakia]

Stability of the sweetener USAL (α-L-aspartyl-L-phenylalanine methyl ester hydrochloride) was studied in various solutions (model systems, citrate-phosphate buffers, solutions of citric acid or sucrose) with respect to pH (1.0–6.95 at 20°C), temp. (20–80°C at pH 2.2) and ionic strength (0.16–2.0 at 20°C and pH 4.0). Stability was greatest at pH 2.5–4.5 and at low temp. Ionic strength had no effect on stability. Effects of additions of citric acid corresponded with the resulting pH changes. Addition of sucrose at concn. > 30% favourably affected stability. IN

138

Artificial sweeteners and cancer.
Newell, G. R.
Progress in Cancer Research and Therapy 17, 273–278 (1981) [10 ref. En] [Univ. of Texas System Cancer Cent., M. D. Anderson Hospital & Tumor Inst., Houston, Texas 77030, USA]

Consideration is given to animal studies using high-saccharin diets and to the extrapolation of results from animals to humans. The link between saccharin use and human bladder cancer is discussed. Potential benefits of non-nutritive sweeteners, such as saccharin, are considered. Other currently available non-nutritive sweeteners are briefly discussed. VJG

139

Dipeptide sweetener compositions.
Eisenstadt, M. E. (Cumberland Packing Corp.)
United States Patent 4 254 154 (1981) [En]

Dipeptide sweetener, which is actually aspartyl phenylalanine methyl ester, is mixed in specific proportions with a sugar, e.g. dextrose, lactose, sucrose, etc. or a sugar alcohol such as xylitol, mannitol, etc. with a glycyrrhizin and with cream of tartar to give a composition approaching the natural sweetness of ordinary sugar while using a minimum of the dipeptide sweetener. AS

140

Oral xylitol (X) in humans. [Lecture]
Wang, Y.-M.; Culbert, S. J.; Fritsche, H. A., Jr.; Carr, D. B.
Federation Proceedings 40 (3, II) 878 (1981) [En]
[Univ. of Texas System Cancer Cent., Houston, Texas 77030, USA]

X and glucose (G) were given to 6 male (M) and 6 female (F) adult volunteers to study human tolerance to X. Diet of subjects was controlled for caloric content and composition. To 3 M or 3 F, X was given for a 17 day (d) period prior to 4-d period of G. To the other 3 M or 3 F, feeding order was reversed. X was increased from 10 g × 3/d to 50 g × 2/d during a 14 d period and this final dose was maintained for an additional 3 d. G was given constantly at 50 g × 2/d. There were 3 d separating X and G feedings regardless of the order of the experiment. The highest X intake was at 16.7 ± 3.7% of daily caloric consumption for M (2100 kcal), and 23.0 ± 3.4% for F (1600 kcal). Fifty-six clinical chemical parameters were determined in blood and urine. Severe diarrhoea was seen in 1 M when X was up to 20 g × 3/d. Diarrhoea-like conditions and flatulence were seen in all subjects. Adaption to X was observed. There was no difference between the order of X or G feeding for all parameters. The results suggest that the adult human can tolerate substantial amounts of daily oral X. Osmotic diarrhoea was the only toxicity. [See FSTA (1981) 13 12A755.] AS

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FAB 3

NATURAL AND SYNTHETIC SWEETENERS

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Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

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Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Metabolic and nutritional aspects of xylitol. [Review]
Ylikahri, R.
Advances in Food Research **25**, 159–180 (1979) [73 ref. En] [Third Dep. of Med., Univ. of Helsinki, Helsinki, Finland]

This review considers the metabolic pathways of endogenous and exogenous xylitol and the effects of both parenteral and oral xylitol on the metabolism of the human body. The tolerability and toxicity of the parenteral and oral xylitol are also discussed. AL

2

Xylitol and oral health.
Mäkinen, K. K.
Advances in Food Research **25**, 137–158 (1979) [38 ref. En] [Dep. of Biochem., Inst. of Dentistry, Univ. of Turku, Turku, Finland]

Aspects dealt with in this review include: xylitol and dental caries (properties of xylitol and cariogenic sugar in relation to dental caries, and lowered cariogenicity of foods containing xylitol); microbiological aspects; in vitro plaque studies; xylitol and the exocrine glands; xylitol and periodontol diseases; mechanism of action of xylitol; and research needs. AL

3

[The legal situation in relation to synthetic sweeteners.] Die Rechtslage bei künstlichen Süssstoffen.
Brustbauer, K.
Ernährung **4** (4) 164–165 (1980) [2 ref. De] [Oberlandesgericht, Justizpalast, A-1010 Vienna, Austria]

Legal aspects of use of synthetic sweeteners in foods in Austria are discussed, with reference to: restrictions on foods in which synthetic sweeteners may be used; prohibition of misleading advertising and description; definition of synthetic sweeteners; the role of saccharin as the only permitted synthetic sweetener; and labelling requirements. AJDW

4

High-resolution/higher-order derivative spectrophotometry in microanalytical chemistry.]
Talsky, G.; Götz-Maler, S.; Betz, H.
Mikrochimica Acta **II** (1/2) 1–9 (1981) [8 ref. En, de] [Inst. für Tech. Chem., Lehrstuhl für Tech. Chem. I, Tech. Univ., Munich, Federal Republic of Germany]

Examples are given of the application of higher-order derivative spectrophotometry to microanalytical problems, including the increase in sensitivity for estimation of Zn and Cd dithizonates and the quantitative detection of arenes, aniline and phenols. Estimation of saccharin in soft drinks, and the characterization and estimation of dyes in solution and after absorption on a thin layer of alumina are also described. Only ng-µg amounts of substance are needed. AS

5

[Metabolic aspects of use of polyols and fructose – a review. I. Xylitol.] [Review]
Wiel-Wetzels, W. A. M. van der
Voeding **42** (9) 309–320 (1981) [118 ref. Nl]

Aspects considered in this review on xylitol include: structure; physicochemical properties; absorption in the digestive tract; laxative effect; effects on the intestinal flora; metabolism of xylitol; excretion of xylitol; effects on blood glucose, insulin, uric acid, lactate and pyruvate contents; effects on lipid metabolism; effects on liver function and biliverdin levels; effects on oxalate decomposition; xylitol in relation to cataract development; use of xylitol in foods for diabetics; toxicology of xylitol; legal aspects of use of xylitol in foods in various countries; and general considerations on the acceptability of xylitol for use as a sweetener. AJDW

6

Comestibles sweetened with alpha amino acid dihydrochalcones.
DuBois, G. E.; Stephenson, R. A. G.; Crosby, G. A. (Dynapol)
United States Patent 4 267 165 (1981) [En]

The α-amino acid homoserine is O-substituted with the dihydrochalcone 1-(2-hydroxyphenyl)-3-(4-alkoxy-3-hydroxyphenyl)propan-1-one at the 4 position of the 2-hydroxyphenyl group, which may optionally have a 6-hydroxy substituent. The 4-alkoxy group has a low number of C atoms. The compounds described are useful as sweeteners for foods and beverages. Also described is a process for preparing these compounds, as well as acid and base neutralization products of the amino acid dihydrochalcones. DIH

7

[Chewing gum.]
Lion Dentifrice KK
Japanese Examined Patent 5 606 260 (1981) [Ja]

Chewing gum compositions employ sucrose fatty acid esters as a sweetener to inhibit the formation of acids from sucrose and hence reduce tooth decay. IFT

8

Testicular responses of rats and dogs to cyclohexylamine overdosage.
James, R. W.; Heywood, R.; Crook, D.
Food and Cosmetics Toxicology **19** (3) 291–296 (1981) [44 ref. En] [Huntingdon Res. Cent., Huntingdon, Cambridgeshire, PE18 6ES, UK]

Cyclohexylamine (CHA), the principal metabolite of cyclamate, was given by oral gavage to male rats (200 mg/kg/day) and male beagles (250 mg/kg/day) for 9 wk. The effects of these doses of CHA on pituitary-testicular hormones, and semen characteristics are described and a quantitative assessment of spermatogenesis is given. VJG

9

Neohesperidin dihydrochalcone: an updated review on a naturally derived sweetener and flavor potentiator. [Review]
Pratter, P. J.
Perfumer & Flavorist 5 (7) 12–14, 16–18 (1981) [21 ref. En] [Nat. Chem. Corp., Aromatics & Flavors Div., Sun Valley, California, USA]

The similarities and interrelationships between naturally occurring dihydrochalcones (flavonoids) and neohesperidin dihydrochalcone (NEO-DHC), a sweetener and flavour potentiator made from naringin, are reviewed. Sections include: physical characteristics of NEO-DHC; extraction of naringin from grapefruit; chemical (structural) relationships of flavonoids to NEO-DHC; introduction to sweeteners; synthesis of NEO-DHC from naringin; flavour formulations; and toxicity studies. RM

10

Non-alcoholic carbonated beverages. Determinatioon of sugar and saccharine contents.
Oman, Ministry of Commerce & Industry
Omanian Standard **OS 31/1981,** 6 + 8pp. (1981) [En, Ar]

Reagents, apparatus, procedures and expression of results are specified for detn. of sugar and of saccharin in non-alcoholic carbonated beverages. AL

11

Non-alcoholic carbonated beverages. Detection of saponine, dolsine [dulcin?] and mineral acids.
Oman, Ministry of Commerce & Industry
Omanian Standard **OS 34/1981,** 6 + 6pp. (1981) [En, Ar]

Colorimetric procedures are described; they involve treatment with concn. H_2SO_4 and ammonium molybdates to indicate the presence of saponins, treatment with mercuric nitrate and lead oxide to indicate presence of dolsine [dulcin?], and treatment with methyl violet indicator to indicate presence of mineral acids. AL

12

[Taste interaction of citric acid with sucrose and synthetic sweeteners.] Beitrag zur geschmacklichen Wechselwirkung von Citronensäure mit Saccharose und Süssstoffen.
Hoppe, K.
Nahrung 25 (3) K1–K4 (1981) [8 ref. De] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

Serial trials were performed to determine sucrose or saccharin-cyclamate concn. that give a balanced sweet-sour ratio when combined with 6 citric acid concn. The required concn. increased exponentially with sweetness intensity. The curve was steeper for the saccharin mixture than for sucrose, although their probability of a citric acid effect was the same. The sweetness (relative to sucrose) of a saccharin-cyclamate mixture increased with acid addition. IN

13

Evidence for a constant number of available sweet receptor sites at threshold concentrations of sugars.
Birch, G. G.; Munton, S. L.
Experientia 37 (8) 839–840 (1981) [9 ref. En] [Nat. Coll of Food Tech., Univ. of Reading, St. Georges Avenue, Weybridge, Surrey KT13 ODE, UK]

Time/subjective intensity of sweeteners plots of solutions of a number of sweet-tasting molecules were obtained at 5–20 × threshold concn. for each compound. Taste panellists recorded intensity (on a scale of 1–100) by controlling a potentiometer on a chart recorder. If it is assumed that subjective intensity R obeys an equation of the type $R = kc^n$, where k is a constant for any 1 molecule, c = concn. and n the taste exponent, then a plot of log R vs. log c gives a line of intercept log k and slope n. Values of k were obtained by this means for 9 sugars and sugar alcohols and are tabulated as 'accession efficiencies' (the fraction of molecules that actually accede to their taste receptor). The product of accession efficiency and threshold concn. is also tabulated as an assumed measure of number of molecules of a compound acceding to receptors at the threshold concn.; structurally related compounds have very similar values, and it is concluded that a constant number of receptors is available for a family of structures. 'Affinities' of sugars for their receptors were obtained by plotting max. intensity/time to max. intensity as 'velocity' in a Lineweaver-Burke-type plot for the 4 concn. used for each molecule. Results are tabulated as 'K_m' values; these values parallel threshold concn., i.e. sucrose has the lowest threshold concn. of the sugars studied, and the lowest 'K_m' for the receptor. DIH

14

[Oral use of xylitol as a sugar substitute in Diabetes mellitus diet.] Die orale Anwendung von Xylit als Zuckeraustauschstoff in der Diät des Diabetes mellitus.
Förster, H.; Mehnert, H.
Industrielle Obst- und Gemüseverwertung 66 (4) 79–83; (7) 157–166; (8) 183–189 (1981) [137 ref. De] [Zentrum der Biol. Chem. der Univ. Frankfurt (Main), Federal Republic of Germany]

This article discusses the metabolism in diabetes mellitus (especially metabolism of carbohydrates), the nature and properties of xylitol (including natural occurrence, physico-chemical, organoleptic and calorific properties), its absorption, distribution, elimination, metabolism and possible toxic effects, applications in special diets (sugar replacer for diabetics), and medical, nutritional and physiological aspects (reduction of dental caries). RM

15

Corn sweeteners in ham formulas.
Hicks, C. L.; Kemp, J. D.; Holbroor, J.; Patterson, K.
Journal of Food Science 46 (5) 1626, 1628 (1981) [En] [Dep. of Anim. Sci., Univ. of Kentucky, Lexington, Kentucky 40546, USA]

Corn sweeteners were compared with sucrose in cure formulas for hams. 36 hams were randomly treated with 9 sweetener treatments replicated 4 times.

Combinations of sucrose, 55% high fructose corn syrup, 42% high fructose corn syrup, and high maltose corn syrup were used in brine formulas for pumping the hams. Sensory evaluations found no significant difference between sweetener type and sensory scores on color, flavour, tenderness, and overall satisfaction. However, ham wt. appeared to be affected slightly by sweetener type. Sucrose produced greater ham yields at a 3% sweetener level. However, 55% high fructose corn syrup at 3.15% equalled the yield observed for sucrose. 42% high fructose corn syrup at 3.3% solid level approached the yields observed for sucrose. Since sensory factors do not appear to be affected by corn syrup solids, only economic and yield factors need be considered for their use in commercially produced hams. IFT

16

Saccharin and bladder tumors. [Letter]
Waddell, W. J.; Lachance, M. P.
Science, USA **214** (4517) 134 (1981) [5 ref. En] [Dep. of Pharmacology & Toxicology, Univ. of Louisville, Louisville, Kentucky 40292, USA]

In relation to reports suggesting increased incidence of bladder tumours in male rats fed high doses of saccharin for prolonged time intervals, it is suggested that pH is a factor which appears to have been overlooked, i.e. pH of urine, intracellular pH of bladder epithelium, and intracellular precipitation of saccharin salts. Tumours may therefore be an artifact of the combination of massive doses of saccharin, renal elimination, and cellular transmembrane pH gradients in the bladder. AL

17

National legislation - United States of America.
World Health Organization
International Digest of Health Legislation **31** (4) 872-902 (1980) [En] [Geneva, Switzerland]

A selection of United States of America health laws and regulations is presented including the following which relates to food hygiene (p. 891): An Act (Public Law 96-273) to amend the Saccharin Study and Labelling Act to extend to June 30, 1981, the ban on actions by the Secretary of Health, Education, and Welfare respecting saccharin (dated 17 June 1980). VJG

18

[Determination of glycyrrhizin in food by HPLC.]
Kitada, Y.; Tamase, K.; Sasaki, M.; Nishikawa, Y.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] **21** (5) 354-359 (1980) [4 ref. Ja, en] [Nara Prefecture, Inst. Public Health, Omori-cho, Nara-shi, Japan]

An HPLC method was developed for the quantitative detn. of glycyrrhizin in soy sauce and miso. A reverse-phase column was applied for the preliminary separation of glycyrrhizin. Extraction from miso was carried out by dialysis against 3% NH_4OH solution. The amounts detected in 55 commercial samples were in the range 0-66 p.p.m. TM

19

[Sweeteners: characteristics and use.] Süssungsmittel Eigenschaften und Verwendung.
Niederauer, T.
Kakao und Zucker **32** (12) 274-278, 281-283 (1980) [11 ref. De] [Firma Gervais Danone AG, Munich, Federal Republic of Germany]

Sweeteners are discussed, with reference to their composition, relative sweetness, physicochemical characteristics, function in foods, and health-related aspects. Sweeteners considered include glucose, fructose, sucrose, raw sugar, brown sugar, invert sugar, lactose, maltose, raffinose, stachyose, honey, maple syrup, glucose syrup, high-fructose corn syrup, sorbitol, mannitol, xylitol, palatinitol, maltitol, lactitol, saccharin, cyclamate, maltol, ethyl maltol, glycyrrhizin, neohesperidin dihydrochalcone, aspartame, stevioside, miraculin and gymnemic acid. AJDW

20

Finely divided sweeteners.
Vadasz, K. (Chimicasa GmbH)
United States Patent 4 293 570 (1981) [En]

Process is described for preparing finely divided cryptocrystalline sweeteners from aqueous solutions of sorbitol, sucrose, fructose, mannitol or glucose. IFT

21

[Low calorie sweetener.]
Kaken Yaku Kako KK
Japanese Examined Patent 5 626 400 (1981) [Ja]

Difructose dianhydride low calorie sweeteners are prepared by the action of *Arthrobacter ureafaciens* on insulin extracts. IFT

22

Xylitol as a sucrose substitute: relation to dental caries. [Review]
Anon.
Nutrition Reviews **39** (10) 368-371 (1981) [9 ref. En]

23

[Simultaneous determination of saccharin, benzoic acid and *p*-hydroxybenzoic acid esters in soy sauce b HPLC.]
Kitada, Y.; Tamase, K.; Sasaki, M.; Nishikawa, Y.; Tanigawa, K.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] **21** (6) 480-484 (1980) [6 ref. Ja, en] [Nara Pref. Inst. of Public Health, Omori-ch Nara-shi, Japan]

An HPLC method was established for simultaneous quantitative detn. of saccharin, benzoic acid, and ethyl, iso-propyl, n-propyl, iso-butyl and n-butyl *p*-hydroxybenzoic acid esters in soy sauce. Samples were simply extracted with ether and filtered through 1 nm filter prior to injection. The UV adsorption detector was set at 254 nm. TM

24

Labdane-type diterpenes from *Stevia rebaudiana* [leaves].
Sholichin, M.; Yamasaki, K.; Miyama, R.; Yahara, S.; Tanaka, O.
Phytochemistry 19 (2) 326–327 (1980) [11 ref. En] [Inst. of Pharmaceutical Sci., Hiroshima Univ., School of Med., 1-2-3 Kasumi, Hiroshima-shi, 734, Japan]

25

[Effect of sugar alcohols on the microassay of D-fructose by D-mannitol dehydrogenase.]
Yamanaka, K.; Tenmizu, K.
Journal of Japanese Society of Food Science and Technology [Nippon Shokuhin Kogyo Gakkaishi] 24 (11) 582–583 (1977) [8 ref. Ja, en] [Dep. of Food Sci., Fac. of Agric., Kagawa Univ., Miki-cho, Kagawa, Japan]

Sugar alcohols (e.g. xylitol, maltitol, sorbitol), even at high concn., did not show any appreciable interference in enzymic microassay of fructose with D-mannitol dehydrogenase from *Leuconostoc mesenteroides*. It is therefore concluded that this procedure can be used for fructose detn. in foods containing sugar alcohols as sweeteners. [From En summ.] JA

26

[Simplified determination of saccharin in foods (by extractive methylation procedure).]
Takatsuki, K.; Sakai, K.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 21 (6) 476–479 (1980) [6 ref. Ja, en] [Miyagi Pref. Inst. of Public Health, Saiwai-cho, Sendai-shi, Japan]

Saccharin in aqueous solution was extracted into an organic solvent as an ion pair with tetrabutylammonium (phase transfer catalyst) and methylated with methyl iodide at room temp. The resulting N-methyl saccharin was quantitated by GLC on a 5% OV-1 or OV-17 column equipped with a flame ionization detector or flame photometric detector (sulphur mode) without any clean-up procedures. This extractive methylation procedure is applicable to daily routine analysis of saccharin in various liquid foods, such as soy sauce. TM

27

[Exploring new sources of sugar – the rapid development of fructose production.]
Chang, L. T.
Food Science and Technology, China No. 7, 8 (1981) [Ch] [Beijing Food Sci. Res. Unit, PB 399, Peking, China]

Fructose is the best sweetener. By using enzymes, it is easy to transform glucose to fructose. Many starch-rich plants, e.g. corn, sorghum, sweet potato, potato, cassava, can be good raw materials for fructose-glucose syrup production. Because of high content of starch, high price of co-products and ease of transport and storage, corn is the ideal raw material among them. GK

28

Sugar-free confectionery material based on xylitol and sorbitol.
Andersen, G. (August Storck KG)
United States Patent 4 292 337 (1981) [En]

Difficulty has previously been experienced in the use of xylitol and sorbitol in confectionery material due to their instability or the fact that they may contain constituents not permitted by food laws. A chewy sugar-free material based on sorbitol and a sugar-free swelling agent is described which has the required plasticity and cohesion so that it can be formed into attractive chewy sweets or hard sweets or gum. Furthermore the tendency of xylitol to recrystallize is suppressed, by the use of a swelling agent which may be carrageenates, pectins, agar, alginates such as sodium alginate or potassium alginate or calcium alginate, carob bean flour, tragacanth, methyl cellulose, carboxymethyl cellulose, gelatin, gum arabic and/or low-sugar maltodextrin. AS

29

Staling resistant baked food product.
Zobel, H. F.; Maxwell, J. L. (CPC International Inc.)
United States Patent 4 291 065 (1981) [En]

The staling of sweet bakery products comprising starch, water and sweetener is reduced by incorporating a preservative agent sugar having high unit anti-staling activity into the sweetener, and/or by increasing the total amount of sugar in the sweetener. Such bakery products contain 15–40% by wt. sweetener, the sweetener itself containing 30–100% by wt. maltotriose. RAW

30

Sweetening compositions containing peptide sweeteners and a method for their manufacture.
Latymer, Z. (Talres Development (NA) NV)
United States Patent 4 292 336 (1981) [En]

A heat-stable sweetening composition containing a peptide sweetener such as thaumatin, is obtained by mixing the sweetener with gelatin at a wt. ratio of gelatin to sweetener of < 100:1. Solid forms can be prepared by drying a co-solution of the sweetener and gelatin in water, preferably containing an edible acid. AS

31

Saccharin – boon or ban.
Roberts, H. R.
Association of Food and Drug Officials, Quarterly Bulletin 45 (1) 3–9 (1981) [En] [Nat. Soft Drink Ass., 1101 Sixteenth Street N. W., Washington, D.C. 20036, USA]

The history of toxicological testing of saccharin is surveyed commencing with early tests of doses of up to 5 g daily soon after its discovery in 1879. The significance of animal studies results showing carcinogenicty of saccharin at very high levels (5% of the diet) is discussed in the light of epidemiological results on humans which show no significant association between consumption of artificial sweeteners (saccharin and cyclamate) and incidence of bladder cancer. It is concluded that increased risk from normal usage of saccharin, if present at all, is small, and little if any cause for concern in human consumers. JRR

32

Crystalline 4,1',6'-trichloro-4,1',6'-trideoxygalacto sucrose.

Jenner, M. R.; Waite, D. (Tate & Lyle Ltd.)

UK Patent Application 2 065 646A (1981) [En]

Manufacture of the title sweetener is described; crystals are obtained from seeded aqueous solutions >38°C for the anhydrate and <38°C for the pentahydrate forms. RAW

33

Sulfamo dihydrochalcone sweeteners.

DuBois, G. E.; Stephenson, R. A. G.

United States Patent 4 283 434 (1981) [En]

Sulfamo dihydrochalcones of the formula $ROPh(OH)(CH_2)_2C(O)Ph(OH)(X)O(CH_2)_2N(H)SO_3^-M^+$ are described, where Ph is phenyl, M^+ is a physiologically acceptable cation, X is H or OH, and R is a lower alkyl. These materials are useful as sweeteners for foods and beverages. They may be prepared by sulphonating the corresponding amino dihydrochalcone using, for example, catechol sulphate. AS

34

Biological properties of aspartame. I. Evaluation of central nervous system effects.

Potts, W. J.; Bloss, J. L.; Nutting, E. F.

Journal of Environmental Pathology and Toxicology 3 (5/6) 341–353 (1980) [33 ref. En] [G. D. Searle Res. & Development Div., PO Box 5110, Chicago, Illinois 60680, USA]

Trials in which aspartame was administered intragastrically to rodents at doses of 10–550× the expected human intake are described; no biologically meaningful effects of acute exposure were observed. Learning behaviour of male rats was modified by feeding aspartame as 9% of the diet for 13 wk; lower doses had no such effect, nor was any effect on learning behaviour of female rats observed. AJDW

35

Biological properties of aspartame. II. Actions involving the gastrointestinal system.

Bianchi, R. G.; Muir, E. T.; Cook, D. L.; Nutting, E. F.

Journal of Environmental Pathology and Toxicology 3 (5/6) 355–362 (1980) [19 ref. En] [G. D. Searle Res. & Development Div., PO Box 5110, Chicago, Illinois 60680, USA]

Feeding trials on rats (doses of ≤250 mg/kg) gave results suggesting that aspartame is devoid of undesirable side effects on the gastrointestinal tract when used as a food sweetening agent. [See preceding abstr. for part I.] AJDW

36

Biological properties of aspartame. III. Examination for endocrine-like activities.

Saunders, F. J.; Pautsch, W. F.; Nutting, E. F.

Journal of Environmental Pathology and Toxicology 3 (5/6) 363–373 (1980) [30 ref. En] [G. D. Searle Res. & Development Div., PO Box 5110, Chicago, Illinois 60680, USA]

Feeding trials with mice, rats and rabbits at levels (approx. 300 mg/kg/day) substantially in excess of expected max. human intake gave results showing that it should have no endocrine-like activity, nor should it alter the action of endogenous steroid hormones. [See preceding abstr. for part II.] AJDW

37

Biological properties of aspartame. IV. Effects on reproduction and lactation.

Lennon, H. D.; Metcalf, L. E.; Mares, S. E.; Smith, J. H.; Nutting, E. F.; Saunders, F. J.

Journal of Environmental Pathology and Toxicology 3 (5/6) 375–386 (1980) [22 ref. En] [G. D. Searle & Co., Res. & Development Div., PO Box 5110, Chicago, Illinois 60680, USA]

Feeding trials with female rats and hamsters (intragastric administration of up to approx. 300 mg/kg/day) showed no effect on fertility; levels of ≤7 mg/kg/day had no effect on dams or their young, whereas higher levels reduced food consumption (due to unpalatability) and caused body wt. loss of dams and retarded growth of the young. [See preceding abstr. for part III.] AJDW

38

Biological properties of aspartame. V. Effects on a variety of physiological parameters related to inflammation and metabolism.

Aspinall, R. L.; Saunders, R. N.; Pautsch, W. F.; Nutting, E. F.

Journal of Environmental Pathology and Toxicology 3 (5/6) 387–395 (1980) [18 ref. En] [G. D. Searle Res. & Development Div., PO Box 5110, Chicago, Illinois 60680, USA]

Feeding trials with rats fed aspartame at levels of ≤103× the expected max. human intake showed that aspartame consumption in great excess would not be expected to significantly impair inflammatory processes nor influence carbohydrate or lipid metabolism. [See preceding abstr. for part IV.] AJDW

39

[Sweetening agent.]

Hayashibara, K.

Japanese Examined Patent 5 622 520 (1981) [Ja]

A sweetening agent having a honey-like flavour is prepared by subjecting a liquified starch composition containing sucrose or fructose, to specified microorganisms. IFT

40

Rubusoside (β-D-glucosyl ester of 13-*O*-β-D-glucosyl-steviol), a sweet principle of *Rubus chingii* Hu (Rosaceae).
Tanaka, T.; Kohda, H.; Tanaka, O.; Chen, F. H.; Chou, W. H.; Leu, J. L.
Agricultural and Biological Chemistry 45 (9) 2165–2166 (1981) [8 ref. En] [School of Med., Hiroshima Univ., Kasumi, Minami-ku, Hiroshima 734, Japan]

As part of a search for new natural sweeteners, a component of *R. chingii* leaves (used as a sweet tea in S. China) was studied. Dried leaves were extracted with hot methanol, which, after washing with ether, was extracted with butanol. Evaporation of the butanol gave a crude glycoside fraction which was purified by silica gel chromatography, eluting with ethyl acetate/ethanol/water (110:4:1 and 16:2:1). A homogeneous compound was obtained as colourless prisms from methanol/water, and which was identified as the β-D-glucosyl ester of 13-*O*-β-glucopyranosyl-steviol. This compound was obtained from dried leaves in a yield of 5.3%, and was designated by the authors as 'rubusoside'. DIH

41

[Psychophysics of sweet taste. III. The effect of various mixture of sucrose, saccharin and cyclamate on the sweetness of aqueous solutions.] Beiträge zur Psychophysik des Süssgeschmacks. III. Über den Einfluss verschiedener Mischungen von Saccharose, Saccharin und Cyclamat auf die Süssintensität wässriger Lösungen.
Hoppe, K.
Nahrung 25 (8) 769–777 (1981) [7 ref. De, en, ru] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

An equation is given for comparison of the sweetness of sweeteners; studies were conducted using sucrose/saccharin/cyclamate mixtures, the resultant relative sweetness being evaluated. Behaviour of the mixture is currently considered to be synergistic, and this was confirmed for saccharin and cyclamate by simple addition of their partial sweetness intensities, indicating independent sweetness stimulation. [See preceding abstr. for part II.] IN

42

Recombinant DNA technology. Food for thought. [Review]
Dally, E. L.; Eveleigh, D. E.; Montenecourt, B. S.; Stokes, H. W.; Williams, R. L.
Food Technology 35 (7) 26–31, 33 (1981) [30 ref. En] [Dep. of Biochem. & Microbiol., Cook Coll., Rutgers Univ., PO Box 231, New Brunswick, New Jersey 08903, USA]

This paper presents a review of recombinant DNA technology under the following headings: recombinant DNA methodologies; selection of genes and vectors of interest; preparation for splicing foreign DNA into a plasmid vector; insertion and maintenance of the recombinant plasmid in the host; selection of the desired clone; potential problems (e.g. regarding the stability of recombinant clones); applications of recombinant DNA technology; and future trends. The section on applications covers the synthesis of the sweetener aspartame and single-cell protein production from *Methylophilis methylotrophus* cultivated on methanol. JA

43

Sweetened edible formulations.
Levin, G. V. (Biospherics Inc.)
United States Patent 4 262 032 (1981) [En]

Various methods for preparing various L-hexose monosaccharides and organoleptic testing with regard to the sweetness of these saccharides as well as their application as sweetening agents in a wide variety of foods, e.g. fruits, vegetables, juices, meat products, dairy products (chocolate dairy drinks), and bakery and confectionery products, are described. The monosaccharides include L-glucose, L-allose, L-fructose, L-gulose, L-galactose, L-altrose, L-idose, L-talose, L-tagatose and L-psicose. RAW

44

Process for the preparation of a hydrolyzed product from whole grain.
Conrad, E. (Kockums Construction AB)
United States Patent 4 282 319 (1981) [En]

Process for the preparation of hydrolysed products from whole grain, and the derived products are described. Whole grain, such as wheat, maize, rye, barley, oats or rice, is treated with a proteolytic enzyme to transform water insoluble proteins into water soluble products, the starch contents are treated with an amylase, free from other carbohydrate hydrolysing enzymes, to form water-soluble starch products, such as mono and disaccharides; the bran fraction is removed and then water is removed to give a dry, semimoist, or concentrated liquid derived product. The product is to be added as a sweetening agent in food products, e.g. bread, beverages and cereal products; the bran obtained can be used in bread as fibre additive. AS

45

[Determination of saccharin in dietetic preparations by gas chromatography.]
Karlowski, K.
Roczniki Panstwowego Zakladu Higieny 31 (6) 581–585 (1980) [20 ref. Pl, ru, en] [Panstwowy Zaklad Higieny, 00-791 Warsaw, Poland]

A method which consists of extraction of saccharin with ethyl acetate, and methylation and GLC detn. as described by Daun [FSTA (1972) 4 2T97], except that the chloroform extracts of the methyl derivative were washed 3 × with water, was found suitable for saccharin determination in non-alcoholic beverages. Sensitivity was 0.2 mg/l, and recovery from cherry juice and from 'Safari' and 'Citroneta' beverages was 67–98% for quantities of 0.2–3.2 mg/l. SKK

46

[Studies on the interaction of the artificial sweeteners sodium saccharin and sodium cyclamate with food ingredients during food preparation and storage.] Untersuchungen über die Wechselwirkung der künstlichen Süssstoffe Natriumsaccharin und Natriumcyclamat mit Lebensmittelinhaltsstoffen bei der Zubereitung und Lagerung von Lebensmitteln.
Kroyer, G.; Washüttl, J.
Ernährung 5 (1) 7–9 (1981) [De, en] [Inst. für Lebensmittelchem. & -technologie, Tech. Univ., Vienna, Austria]

An artificial sweetener of sodium saccharin + sodium cyclamate was incorporated into the following 5 food products, and contents of certain substances (in parenthesis) were determined in the prepared foods: cake, baked for 30 min at 200°C (vitamin B); coffee beverage, sweetener added at 80°C, (caffeine); punch, sweetener added at 80°C (ethanol); fish marinade, stored for 8 days at room temp. (acetic acid); and marmalade, processed at 90°C for 30 min (vitamin C). Products with added sucrose, subjected to identical treatment, served as controls. Results are discussed, together with decreases in content of synthetic sweetener. Contents of cyclohexylamine (a toxic degradation product of sodium cyclamate) of up to 1.1% of initial sodium cyclamate content were detected. It is concluded that sweetener and vitamin stability was only affected during extended high temp. treatment (baking); stability of the sweeteners, in a chemically reactive (e.g. acid) medium and subjected to long storage was decreased. RAW

47

[Use of glycyllysine as a sweetener in food.]
Doi, J.
New Food Industry [Nyu Fudo Indasutori] 23 (3) 36–39 (1981) [Ja]

Properties of glycyllysine which make it a particularly useful food additive are its sweetness (250 times that of sugar), the persistence of its taste, solubility in water, ethanol and propylene glycol, heat stability (up to 212°C), pH stability, resistance to browning, and resistance to biodegradation. Glycyllysine can be used as a sweetener, a flavour enhancer and a foam stabilizing agent, it can also be used to prevent 'bloom' and to disperse colloids. The author's company (Maruzen Kasei KK) have produced 4 flavour enhancers: 'Gurichimin' containing glycyllysine; 'Marumiron 50' containing stevioside; and 'Marumiron A' and 'Marumiron S' which contain both compounds. The use of these 4 products is discussed with the aid of examples. CIH

48

[Metabolic aspects of use of polyols and fructose – a review. II. Fructose.] [Review]
Wiel-Wetzels, W. A. M. van der
Voeding 42 (10) 347–356 (1981) [92 ref. NI]

Aspects considered in this review of metabolic aspects of use of fructose as a sweetener include: physical and chemical characteristics; absorption of fructose; laxative action; effects on the gut microflora; metabolism of fructose; excretion; effects of fructose on metabolism; fructose in relation to diabetes mellitus; and the acceptability of fructose for use as a sweetener. [See FSTA (1982) 14 2C80 for part I.] AJDW

49

Sweetener and flavoring compositions and method of producing same.
Bliznak, J. B.; Harcarufka, R. E. (Alberto-Culver Co.)
United States Patent 4 277 511 (1981) [En]

Low calorie sweetener compositions comprise mixtures (approx.; by wt.%) of corn starch hydrolysate (90) with minor proportions of ammoniated glycyrrhizin (2.5), monosodium phosphate (3.5) and ethyl maltol (1). IFT

50

[4-hydroxy-1,2-benzisothiazol-3(2H)-on-1,1-dioxides, their salts, their manufacture and application.]
4-Hydroxy-1,2-benzisothiazol-3(2H)-on-1,1-dioxide, ihre Salze, ihre Herstellung und Verwendung.
Trummlitz, G.; Eberlein, W.; Engel, W.; Schmidt, G. (Dr. Karl Thomae GmbH)
German Federal Republic Patent Application 3 015 113 (1981) [De]

Sweeteners which combine the properties of absolute safety, impeccable flavour and adequate solubility, are described; the preferred compounds are the sodium or calcium salts of 4-hydroxy-1,2-benzisothiazol-3(2H)-on-1,1-dioxide or of 4,4-dihydroxy-1,2-benzisothiazol-3(2H)-on-1,1-dioxide. W&Co

51

The sweet and sour history of saccharin, cyclamate and aspartame.
Lecos, G.
FDA Consumer 15 (7) 8–11 (1981) [En]

The history and current status of the 3 synthetic sweeteners saccharin, cyclamate and aspartame are described. VJG

52

Dihydrochalcone sweeteners. Synthesis and sensory evaluation of a homoserine-dihydrochalcone conjugate with low aftertaste, sucrose-like organoleptic properties.
DuBois, G. E.; Crosby, G. A.; Lee, J. F.; Stephenson, R. A.; Wang, P. C.
Journal of Agricultural and Food Chemistry 29 (6) 1269–1276 (1981) [15 ref. En] [Chem. Synthesis Lab., Dynapol, Palo Alto, California 94304, USA]

In an attempt to find an analogue of neohesperidin dihydrochalcone (NHDHC) that is as sweet as NHDHC but that lacks its non-sucrose-like lingering aftertaste, a number of amino acid-dihydrochalcone conjugates were synthesized in which the neohesperidosyl moiety of NHDHC is replaced by an ether link to a hydroxyamino acid. The amino acid functions studied were (i) homoserine (2-amino-4-hydroxybutanoic acid), (ii) 3-amino-4-hydroxybutanoic acid, (iii) 4-amino-2-

hydroxybutanoic acid, and (iv) 4-hydroxyproline. The homoserine conjugate had a high sweetness potency with significantly reduced aftertaste in comparison to NHDHC, the 1st reported dihydrochalcone sweetener with a diminished aftertaste. The other conjugates prepared had greatly reduced taste potencies; conjugates of (i)–(iv) were 400, 210, 0 and 70 times sweeter than sucrose, vs. 340 × for NHDHC (conjugate of (iii) was tasteless). It was thought that sweetness potency may be related to hydrophile-lipophile balance, as quantitated by the chromatographic parameter k' [from reversed-phase HPLC, where $k' = (t_R - t_O)/t_O$, t_R being compound retention time and t_O time for elution of column void volume]. Values of k' for the dihydrochalcone analogues of (i)–(iv) were 11.0, 9.6, 5.8 and 10.0, resp. The greater polarity of the (iii) conjugate may be responsible for its tastelessness; no mechanism is proposed for the reduction in aftertaste of the homoserine analogue. DIH

53

[Review of literature on artificial sweeteners.]
Literaturübersicht über Süssstoffe. [Review]
Askar, A.; Abd-El-Baki, M.; El-Samahy, S.
Alimenta 20 (4) 87–89 (1981) [21 ref. De, en] [Dep. of Food Sci., Univ. of Zagazig, Zagazig, Egypt]

This literature review deals with sensory problems of artificial sweeteners and the chemical, sensory and toxicological properties of dulcin, cyclamate, saccharin and the new, recommended sweeteners aspartame and acesulfam. RM

54

Edulcoration of white wine with four different sweeteners.
Duitschaever, C. L.; Buteau, C.; Ashton, G. C.
American Journal of Enology and Viticulture 31 (4) 337–343 (1980) [5 ref. En] [Dep. of Food Sci., Univ. of Guelph, Guelph, Ontario, Canada, N1G 2W1]

Seyval Blanc and Elvira grapes were vinified to dryness at 13°C. The wines were edulcorated (deacidified) with 4 types of sweeteners: grape juice reserve from which the wines were made (Seyval Blanc and Elvira), Catawba grape juice reserve, granular glucose and liquid invert sugar. Sensory evaluation of the wines by experienced tasters showed that edulcoration improved the overall quality of the wines. Although the judges failed to discriminate between the 2 types of grape juice reserve (Elvira or Seyval Blanc and Catawba), grape juice reserve was preferred over glucose and invert sugar. AS

55

Rapidly-soluble sweetener, process for its preparation and beverage mix employing it.
Pitchon, E.; Schulman, M. (General Foods Corp.)
United States Patent 4 303 684 (1981) [En]

A rapidly-soluble sweetener, a process for preparing it, and improved dry beverage mixes employing it are described. The composition preferably comprises 15–65% fructose, 15–30% low DE dextrinized starch, and 30–65% sucrose, on a dry solids basis. By preparing it with a density of ≤0.4, solubility is greatly enhanced over traditional sweeteners, especially sucrose. Because of the improved solubility, carbonation is not lost (by requiring stirring of a sweetener) when preparing a beverage from a dry carbonated beverage mix. AS

56

Evaluating sweetness.
Horn, H. E.
Food Product Development 15 (4) 28–30, 32, 36, 57–58 (1981) [En]

The term sweetness is first defined and described. A listing and description of the following common nutritive sweeteners is presented: sucrose; fructose; dextrose; corn syrup; high fructose corn syrup; and invert syrups. The ability to taste sweetness, the behaviour of sweeteners in some simple foods and the evaluation of sweetness by test panels are discussed. VJG

57

Characteristics of frozen desserts sweetened with xylitol and fructose.
Abril, J. R.; Stull, J. W.; Taylor, R. R.; Angus, R. C.; Daniel, T. C.
Journal of Food Science 47 (2) 472–475 (1982) [En] [Dep. of Nutr. & Food Sci., Univ. of Arizona, Tucson, Arizona 85721, USA]

Combinations of xylitol, fructose and 24 DE corn syrup solids (CSS) were the sweetening agents in ice cream-type frozen desserts. A 2^3 factorial experimental design evaluated the most acceptable combinations of xylitol (4% or 6%), fructose (4% and 6%) and CSS (10% and 12%). Based on chemical, physical and sensory analyses of the 8 experimental combinations it was demonstrated that a formulation involving 6% xylitol, 6% fructose and 10% CSS gave product acceptability similar to that of an ice cream with conventional ingredients and composition. IFT

58

Saccharin. A report. [Book]
Cranmer, M. F.; Scherr, G. H. (Editors)
xiii + 586pp. ISBN 0-930376-06-4 (1980) [many ref. En] [2405 Bond Street, Park Forest South, Illinois, USA; American Drug Research Institute Inc. Price $28.00

This report, compiled by M. F. Cranmer and edited by G. H. Scherr, deals with work done on the safety and efficacy of saccharin use in foodstuffs, with regard to its carcinogenicity. After several introductory sections, including historical perspectives, criteria for establishing or rejecting the carcinogenicity of saccharin, in-depth analysis of each saccharin long-term bioassay, and unresolved questions identified by the office of technology assessment, 7 charges (investigative queries) are dealt with. Charges are summarized as follows: review the current knowledge concerning the role of direct-acting carcinogens vs. tumour-promoting agents with respect to pathogenesis of bladder cancer in experimental animals (pp. 121–240); describe and evaluate on-going research conducted by various groups (pp. 241–303); evaluate research proposed by NCTR (National Centre for

Toxicological Research) during the Nov. 1977 meeting at Parklawn (pp. 305–306); develop protocol outlines for a series of interrelated experiments appropriate to identifying qualitatively and as far as possible quantitatively mechanisms of saccharin carcinogenicity with respect to the bladder, other than those already proposed by NCTR (pp. 307–424, 203 ref.); assess likelihood of significant new knowledge emerging from other institutions, in order to minimize repetition of studies at NCTR and outline proposals for NCTR research into mechanisms of carcinogenicity of saccharin, cyclamates, xylitol and other test substances likely involved in aetiology of bladder cancer (pp. 425–453); evaluate and make recommendations on need for additional research on mutagenic potential of saccharin and its metabolites (pp. 454–501); a coordination of aforementioned work should be made, to integrate laboratory programmes and epidemiological efforts (pp. 503–512). Each charge has bibliographies, etc. LH

53

A sweetener.
Adachi, T.; Hidaka, H. (Meiji Seika Kaisha Ltd.)
UK Patent Application 2 072 679A (1981) [En]

Low cariogenic sweetener compositions comprise oligosaccharides of 1–4 molecules of fructose bound to sucrose. They are prepared by reacting sucrose in the presence of fructosyl transferase. The resulting sugar solution may then by subjected to catalytic reduction to convert glucose and fructose to sorbitol and mannitol. The sweeteners can be incorporated into various foods. RAW

54

***Stevia rebaudiana*. II. High-performance liquid chromatographic separation and quantitation of stevioside, rebaudioside A and rebaudioside C.**
Ahmed, M. S.; Dobberstein, R. H.
Journal of Chromatography 236 (2) 523–526 (1982) [9 ref. En] [Stevia Co. Inc., 746 West Algonquin Road, Arlington Heights, Illinois 60005, USA]

Interest has grown in the assay of the non-calorie diterpene glycoside sweeteners found in leaves of *Stevia rebaudiana*. These are known to be stevioside (SS), rebaudioside A (RA) and rebaudioside C (dulcoside B) (RC), but their separate estimation has not been successful. A new HPLC method is described. Dried-leaves of *S. rebaudiana* are extracted with $CHCl_3$ for 3 h giving extract A and for 5 h with methanol (extract B); plant marc was then refluxed with distilled water for 1 h (extract C) and each extract was evaporated to dryness in vacuo and residues were dissolved in $CHCl_3$ or 1-propanol/water for chromatographic analysis. Operating conditions for HPLC are described and standard solutions of SS, RA and RC were injected on to the columns to measure the resulting peak heights. Various solvents were tried without success to separate the peaks and attempts were then made to purify the extract prior to HPLC. After several unsuccessful attempts, satisfactory resolution of SS, RC, and RA was achieved by using 2 protein columns in series for extracts A and B; extract C contained no diterpene glycosides. Min. detectable quantities of SS, RC and RA were resp. 1.0, 2.0 and 2.0 μg. [See FSTA (1980) 12 11L741 for part I.] ELC

55

[Sweetener-seasoning.]
Kikkoman KK
Japanese Examined Patent 5 644 710 (1981) [Ja]

Sweetener-seasoning compositions are prepared by adding steamed non-glutinous rice to an alcohol solution containing malted rice and α-amylase. The composition is then saccharified and aged. A mirin-like product can be obtained from non-glutinous rice. AS

56

Potential sweetening agents of plant origin. I. Purification of *Stevia rebaudiana* sweet constituents by droplet counter-current chromatography.
Kinghorn, A. D.; Nanayakkara, N. P. D.; Soejarto, D. D.; Medon, P. J.; Kamath, S.
Journal of Chromatography 237 (3) 478–483 (1982) [19 ref. En] [Dep. of Pharmacognosy & Pharmacology, Univ. of Illinois, Chicago, Illinois 60612, USA]

Studies were conducted to evaluate use of droplet counter-current chromatography (DCCC), on a Tokyo Rikakikai Model-A instrument, for purification and small-scale preparation of sweet principles from *Stevia rebaudiana*. Milled *S. rebaudiana* leaves were macerated with methanol/water (4:1), the solvent was evaporated off the macerate, the residue was dissolved in water and defatted with ethyl acetate, the aqueous layer was partitioned with n-butanol, and the combined organic layer evaporated to dryness. This crude extract was dissolved in methanol, and held at 5°C for 12 h for stevioside precipitation. The remaining filtrate was evaporated to dryness. Both fractions were then subjected to DCCC, using a chloroform/methanol/isopropanol/water (11:9:4:8) solvent system. DCCC elution chromatograms are given. Separation of stevioside, steviolbioside, dulcoside A and rebaudiosides A, B and C was generally good, apart from overlapping of peaks for stevioside and for rebaudioside C. A preliminary separation procedure is therefore necessary to separate stevioside before isolation of rebaudioside C by this method. AJDW

57

Determination of saccharin by desorption of ferroin from silica gel.
Clark, E. R.; Yacoub, E.-S. A. K.
Analyst 107 (1273) 414–421 (1982) [17 ref. En] [Dep. of Chem., Univ. of Aston in Birmingham, Gosta Green, Birmingham B4 7ET, UK]

A simple, rapid and accurate method for detn. of saccharin is described, based on quantitative formation of an ion-association complex when a solution of saccharin in distilled water, 60% ethanol, 80% methanol or 70% acetone solution is shaken with ferroin-impregnated silica gel. The extinction value of the characteristic orange complex is determined at 510 nm, saccharin concn. being determined by means of a calibration graph. Glucose, sucrose and dulcin do not interfere even at concn. 1600 × those of saccharin. Cyclamate, sorbic acid, benzoic acid, citric acid and NaCl may interfere, giving positive errors. $NaHCO_3$ gives low recoveries, but can be eliminated by treatment with acid. Application of the method to saccharin tablets is described. AJDW

58

[Analytical methods for stevia components in natural sweetener preparations.]
Hirokado, M.; Nakajima, I.; Nakajima, K.; Mizoiri, S.; Endo, F.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] 21 (6) 451–456 (1980) [9 ref. Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health, Hyakunincho 3-chome, Shinjuku-ku, Tokyo, Japan]

A qualitative analytical method for stevia components in natural sweetener preparations was established by TLC on silica gel. HPLC was applied for the quantitative determination of stevioside and rebaudioside A among stevia components. Analysis of 14 commercial products of sweetener preparations showed the presence of 0.47–38% stevioside and 0.26–12% rebaudioside A. TM

59

[Water vapour sorption isotherms of sugar substitutes in the temperature range 25° to 80°C.]
Wasserdampf-Sorptionsisothermen von Zuckeraustauschstoffen im Temperaturbereich von 25 bis 80°C.
Weisser, H.; Weber, J.; Loncin, M.
Zeitschrift für Lebensmittel-Technologie und -Verfahrenstechnik 33 (2) 89, 91–92, 94, 96–97 (1982) [24 ref. De, En] [Inst. für Lebensmittelverfahrenstech., Univ. Karlsruhe, Postfach 6380, 7500 Karlsruhe 1, Federal Republic of Germany]

Sorption isotherms of 4 sweeteners (xylitol, sorbitol, mannitol and the new α-D-glucopyranosido-1,6-mannitol/α-D-glucopyranosido-1,6-sorbitol preparation 'Palatinit') were determined by 2 methods: a desiccator method, and a procedure using a sorption apparatus with a rotating plate. Sorption isotherms are presented for the a_w range 0–1.0, temp. 25–80°C. Sorption characteristics of the polyols were generally similar to those for sugars. Temp. effects were relatively small, except that a clear temp. effect was observed for the kink in the curve at which surface dissolution of the polyols is initiated. AJDW

60

Some new food sweeteners.
Anon.
British Food Journal 83 (904) 140–142 (1981) [En]

Natural sweeteners and modern synthetic and derived sweeteners are discussed, with mention of sugar from various sources, saccharin, cyclamate, aspartame, glycyrrhizin, monellin, neohesperidin hydrochalcones, sorbitol, mannitol and xylitol, and protein sweeteners. In each case uses and controls are briefly described. IRR

61

Artificial sweetener composition and process of preparing and using same.
Dwivedi, B. K.; Sampathkumar, P. S. (Chimicasa GmbH)
United States Patent 4 304 794 (1981) [En]

Artificial-sweetening compositions, that are useful as a low-calorie sweetening agent when sweetening foods and other low-calorie products, are prepared by solubilizing 2,4,6,3'-tetrahydroxy-4'-methoxydihydrochalcone by combining and interacting the water-insoluble dihydrochalcone with hydroxy-containing organic compounds; the resulting water-soluble dihydrochalcone has enhanced sweetening power and improved aftertaste. The sweetener compositions can be incorporated into foods, including confectionery products, and beverages. [From En summ.] RAW

62

[Study of sweeteners used in production of gaseous and flavoured beverages.]
Sanchez Perez, A.; Yarte del Moro, A.; Suarez Donate, M. L.
Boletin del Centro Nacional de Alimentacion y Nutricion No. 5, 27–32 (1981) [8 ref. Es, en]

Natural (sugar) and synthetic (cyclamates and saccharin) sweeteners were determined in 320 samples of beverages, i.e. 91 aerated beverages, 78 orange-flavoured, 80 lemon-flavoured and 71 cola-flavoured drinks. Detailed figures show that about 70% of the beverages contained cyclamate, 97% saccharin, and only 1 or 2 samples of each type were sweetened with sugar only. Max. cyclamate contents were found in cola-flavoured drinks (149.4 mg%). Most of the other beverages contained 10-74 mg % (in 68% of cyclamate-containing samples). Saccharin concn. in most samples ranged from 5 to 16% (in 68% of saccharin-containing samples). The results are discussed in the light of Spanish and other legislation, and of WHO and IARC (International Agency for Research on Cancer) recommendations, especially with regard to cyclamates. RM

63

[Sweetening agent or composition based on D-tryptophan and its use as a sugar substitute.]
Pia, Y.
French Patent Application 2 479 656 (1981) [Fr]

It has been found that certain concentrations of D-tryptophan possess a sweetening capability enabling its use as a sugar substitute; unlike L-tryptophan or other known sweeteners, it is not metabolised by the body. Above a particular concn. the sweet taste gives rise to increasing bitterness, and it has been found that the most effective sweetness occurs at a concn. of 5–120 mg, preferably 70–90 mg, with 50 ml water being taken as the reference liquid. The sweetener is prepared in powder form or as a cube: cube sizes of 500 mg and 1 g contain 50 mg and 100 mg D-tryptophan, resp. W&Co

64

The evaluation of activated carbon in the purification of starch-based sweeteners.
Asbeck, T. M. W. van; Gouwerok, M.; Polman, E.
Starch/Stärke 33 (11) 378–383 (1981) [En, de] [Norit NV, PO Box 105, 3800 AC Amersfoort, Netherlands]

The main production processes for activated carbon, i.e. steam activation and chemical activation, and the adsorptive properties of the resulting carbons are explained, based on standard adsorption tests (benzene adsorption, molasses number). The correlation between these properties and the aspects that are important in the purification of starch-based sweeteners is established. With the help of results from laboratory tests on glucose syrup using activated carbons with different adsorptive properties, their specific qualities are demonstrated, and criteria for the selection of an activated carbon discussed. Some practical aspects of the application of activated carbon are discussed. AS

65

Corn sweeteners: functional properties.
Horn, H. E.
Cereal Foods World 26 (5) 219–223 (1981) [2 ref. En]

The functional properties of corn sweeteners include viscosity, control of moisture content by humectancy, fermentability, promotion of browning reactions and crystallization behaviour, besides the obvious role of sweetening. The functional roles are discussed in detail, and the range of corn-based sweeteners available is briefly surveyed. JRR

66

[Stevia taste improvement.]
Ogon To KK
Japanese Examined Patent 5 646 776 (1981) [Ja]

The flavour of Stevia [rebaudiana] extract sweetening compositions is improved by the incorporation of potassium phosphate, glucono-δ lactone and optionally maltose. Such additions remove the bitterness and unpleasant taste of the Stevia. IFT

67

[Natural peptide and protein sweeteners.] [Review]
Anon.
Bios 12 (3) 18–23 (1981) [46 ref. Fr]

After a brief discussion of perception of sweet taste, and taste properties of amino acids, characteristics and applications of some individual peptide and protein sweeteners are described. Applications referred to are chiefly for aspartame in beverage use (outside France; such sweeteners in France are restricted to therapeutic use only). Sweeteners covered are aspartame, monellin, thaumatin and miraculin. DIH

68

[Survey of natural sweeteners. II. Analysis of stevia components in commercial natural sweetener products.]
Nakajima, I.; Hirokado, M.; Nakajima, K.; Mizoiri, S.; Endo, F.
Annual Report of Tokyo Metropolitan Research Laboratory of Public Health 31 (1) 180–184 (1980) [6 ref. Ja, en] [Tokyo Metropolitan Res. Lab., of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

Stevia components in 11 commercial natural sweetener products were analysed; qualitative analysis was carried out by TLC, and the total amount of stevia components in each product was determined by gas chromatography. Concn. of stevioside and rebaudioside A were determined by HPLC. Stevioside, rebaudioside A, B, C and steviolbioside were analysed qualitatively in all 11 products. Concn. of total stevia component, stevioside and rebaudioside A were determined to be 1.23–8.83%, 0.47–4.77% and 0.18–3.59%, resp. AS

69

[Quantitative determination of saccharin in alcohol-free soft drinks.] Quantitative Bestimmungen von Saccharin in alkoholfreien Erfrischungsgetränken.
Hoppe, K.; Krüger, G.
Lebensmittelindustrie 28 (11) 501–502 (1981) [1 ref. De, en, ru, fr] [Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

A procedure is described to avoid the need to establish specific calibration curves for each beverage in analysis for saccharin by spectrophotometry; it involves analyses of 3 samples of the beverage, one without addition of saccharin, the others with graded additions of saccharin. A procedure for calculation of the saccharin concn. in the beverage under test on the basis of the resulting analytical data is given. Results of trials with this method show repeatibility to be good; the method is not suitable for saccharin levels <9 mg/l. AJDW

70

Glucose isomerase. [Review]
Chen, W.-P.
Process Biochemistry 15 (5) 30–35; 15 (6) 36–41 (1980) [many ref. En] [Taiwan Sugar Res. Inst., 54 Sheng Chan Road, Tainan, Taiwan]

The production, extraction, purification, properties and immobilization of glucose isomerase are reviewed. Use of high fructose corn syrup, produced using glucose isomerase, in the food industry as a sweetener for carbonated beverages, fountain syrups, ketchup, pourable and spoonable salad dressings, and yeast raised baked goods, is briefly discussed. SP

71

Effect of a synthetic dihydrochalcone sweetener (Chinoin-401) on carbohydrate metabolism.
Szabo, P.; Ferenczy, T.; Bolla-Pusztai, E.; Szejtli, J.
Acta Alimentaria **11** (1) 31–37 (1982) [9 ref. En] [Dep. of Zoology & Anthopology, Kossuth Univ., H-4010 Debrecen, Egyetem ter 1, Hungary]

Rabbit feeding trials were undertaken with a simple dihydrochalcone sweetener that contains a 4-sulphopropoxy substituent on the 'A' ring. Administration of 50–250 mg/kg body wt. for 30 days caused no significant change in blood glucose concn., but hepatic glucose-6-phosphatase was increased and liver glycogen was decreased. Light micrographs of pancreas tissue from treated rabbits show no damage to islets of Langerhans. DIH

72

[New artificial sweeteners and their health implications.]
Wolf, A.
Vyziva Lidu **25** (10) 151 (1980) [Cs] [Katedra Hygieny Vyzivy, LFHKU, Prague, Czechoslovakia]

This review-type article lists the large number of sweetening compounds in existence, with more detailed mention of Dulcin, Suosan, 5-nitro-2-propoxyaniline, *O*-(*p*-anisoyl) benzoic acid (S 23/46), neohesperidin dihydrochalcone, stevioside, and monellin; and discusses carcinogenic and toxicological properties of cyclamates, saccharin and aspartame. Particular attention is given to the new Czechoslovak sweetener Usal (L-α-aspartyl-L-phenylalanine hydrochloride), results of tests on animals and diabetics being described and an acceptable daily intake (ADI) of 20 mg/kg body wt. being quoted. SKK

73

[The tropical plant *Stevia rebaudiana*.]
Toffler, F.; Orio, O. A.
Rivista della Societa Italiana di Scienza dell'Alimentazione **10** (4) 225–230 (1981) [33 ref. It] [Lab. di Chimica del Farmaco, Istituto Superiore di Sanita, Rome, Italy]

Stevia rebaudiana and the sweet glycoside stevioside which may be prepared from it are discussed. Aspects considered include botanical characteristics, cultivation, harvesting, chemical composition, extraction of stevioside, and the structure of stevioside and related compounds occurring in *S. rebaudiana*. AJDW

74

Evaluation of renal function in saccharin treated rats.
Berndt, W. O.; Reddy, R. V.; Hayes, A. W.
Toxicology **21** (4) 305–316 (1981) [18 ref. En] [Dep. of Pharmacology & Toxicology, Univ. of Mississippi Med. Cent., Jackson, Mississippi 39216, USA]

Effects of dietary saccharin intakes at up to 7.5% of the diet as sodium saccharin, upon the renal function of rats exposed for up to 6 months was studied. Significant effects on renal function, including reductions in p-aminohippurate and tetraethylammonium transport, were noted, but all changes were fully reversible when saccharin was withdrawn from the diet for as little as 24 h. JRR

75

Gas chromatographic determination of sorbitol, mannitol, and xylitol in chewing gum and sorbitol in mints.
Daniels, D. H.; Warner, C. R.; Fazio, T.
Journal of the Association of Official Analytical Chemists **65** (3) 588–591 (1982) [11 ref. En] [Div. of Chem. & Physics, FDA, Washington, DC 20204, USA]

A method has been developed for detn. of sorbitol, mannitol and xylitol in chewing gum and sorbitol in mints. Chewing gum is partitioned between methylene chloride and water; the mint is simply dissolved in water. The aqueous extract is dried and the residue is derivatized with pyridine-acetic anhydride to form the corresponding peracetates. The derivatives are quantitated by gas chromatography using a 9 ft × 2 mm column packed with 10% Silar 10C on Chromosorb W/AW. Average recoveries of these sugar alcohols ranged from 96 to 102%. AS

76

[Determination of glycyrrhic acid and glycyrrhetic acid by reverse-phase HPLC.]
Salto, F.; Arin, J.
Anales de la Facultad de Veterinaria de Leon **25**, 43–47 (1979) [3 ref. Es, en]

A procedure is described for detn. of glycyrrhic acid (the sweet principle of liquorice) and glycyrrhetic acid; methanolic extracts containing these compounds are analysed by HPLC on an ODS Partisil PX5 10/25 column, with a 70% aqueous methanol mobile phase (containing 0.25% acetic acid). Error is approx. 2.5%. AJDW

77

Additives and contaminants in the food supply.
Elton, G. A. H.
Food Technology in Australia **33** (4) 184–188 (1981) [11 ref. En] [Min. of Agric., Fisheries & Food, London, UK]

The problems of ensuring that the nation's food supply is wholesome and safe are discussed. The assessment of short-term and long term hazards, and the toxicological testing of food additives are briefly considered. Examples considered are: the use of sodium nitrite as a meat curing additive; the use of saccharin as a sweetener; the presence of heavy metals as contaminants; and the presence of aflatoxin in mould-infested foodstuffs. VJG

78

[Metabolic aspects of use of polyols and fructose – a review. III. Sorbitol.] [Review]
Wiel-Wetzels, W. A. M. van der
Voeding **42** (12) 414–422 (1981) [81 ref. Nl]

Use of sorbitol as a sweetener in foods in discussed, with reference to: physical and chemical aspects of sorbitol; absorption; laxative action; effects on the intestinal flora; metabolism of sorbitol (distribution and concn. in the blood, metabolic degradation of sorbitol, tissues in which sorbitol is metabolized); excretion of sorbitol; effects of sorbitol on metabolism (blood glucose and insulin levels, uric acid and lactate/pyruvate levels in the blood, lipid metabolism); sorbitol in relation to diabetes mellitus; acceptability of use of sorbitol in foods; and legal aspects. [See FSTA (1982) 14 7C303 for part II.] AJDW

79

[Metabolic aspects of use of polyols and fructose - a review. IV. Mannitol.] [Review]
Wiel-Wetzels, W. A. M. van der
Voeding 43 (1) 23-26 (1982) [22 ref. Nl]

Use of mannitol as a sweetener in foods is discussed, with reference to: physical and chemical characteristics; absorption of mannitol; laxative action; effects on intestinal microflora; metabolism; excretion; effects on metabolism; mannitol in relation to diabetes mellitus; acceptability of use of mannitol in foods; and legal aspects. [See preceding abstr. for part III.] AJDW

80

Sweetener/energy interrelationships.
Anon.
Food Processing 42 (1) 30–31 (1981) [En]

The supply of sugar and other sweeteners is discussed, and brief information is presented on production capacity and supply availability of high fructose corn syrup from USA manufacturers. JRR

81

High pressure liquid chromatographic determination of glycyrrhizic acid or glycyrrhizic acid salts in various licorice products: collaborative study.
Vora, P. S.
Journal of the Association of Official Analytical Chemists 65 (3) 572-574 (1982) [4 ref. En]
[MacAndrews & Forbes Co., Third St & Jefferson Avenue, Camden, New Jersey 08104, USA]

8 laboratories participated in a collaborative study of an HPLC method for detn. of glycyrrhizic acid (GRA) and its salts in liquorice products. Each collaborator analysed 5 products containing GRA at 2.5-32%, using a μBondapak C_{18} column and water/acetic acid/acetonitrile (61 + 1 + 38) as eluent. Results are tabulated. Precision within and between laboratories was excellent; coeff. of variation for reproducibility were <7.5%. Analysis takes <15 min, compared with 3 days for gravimetric methods. The method has been adopted official 1st action. DIH

82

Sweet substitute set for marketing.
Anon.
Food Engineering International 6 (10) 21, 23 (1981) [En]

The low-calorie sweetener aspartame, recently approved by the FDA, is briefly reported. The product is claimed to have more similar taste to sugar than previous substitutes, to be almost 200× sweeter than sugar, and to be without the after taste sometimes attributed to cyclamates and saccharin. The product, marketed by G. P. Searle & Co. (anticipated marketing onset October 1981) may be used in cold cereals, gelatins, puddings, drink mixes, dairy products and toppings. It is anticipated that aspartame will be available from early 1982 in tablet or powder form, a 'table top' sweetener named Equal. The sweetener is no suitable for use in 'diet' soft drinks, as it loses sweetness over extended periods, or in bakery products, as sweetness is also lost under heat treatment. RAW

83

Approved by FDA, aspartame debuts as low-calorie sweetener.
Anon.
Food Development 15 (8) 44-45 (1981) [En]

Aspartame, the first low-calorie sweetener to receive FDA approval in 25 yr, won GRAS status on 15 June 1981, and is marketed as NutraSweet. Consideration is given to: its characteristics, applications, advantages, and tests. VJG

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   (Note: This must be the personal signature of the person making the request. A stamped or typewritten signature or the signature of an agent is NOT sufficient.)

4. Send this form and remittance (20p per page for photocopies, min. charge £2.00 per article) to the above address. A deposit or credit system for payment is also in operation. Details are available on request.

Note: Additional forms are available on-request.

Food Annotated Bibliographies (FABs)

	1969-81 Price	1982 Price	1983 12 monthly issues Price
1. Application of Reverse Osmosis to Food Processing	□ £11.00	□ £6.00	□ £10.00
2. New Sources of Food Protein	□ £19.50	□ £13.00	□ £20.00
3. Natural and Synthetic Sweeteners	□ £12.00	□ £7.00	□ £11.50
4. Techniques for Analysis of Flavour Volatiles	□ £13.00	□ £8.00	□ £13.00
5. Microwaves in Food Processing	□ £10.50	□ £5.50	□ £10.00
6. Texture Analysis of Foods	□ £16.00	□ £8.50	□ £14.00
7. Synthetic Dairy Products	□ £11.00	□ £6.00	□ £10.50
8. Acidulants in Food	□ £11.00	□ £6.00	□ £10.00
9. Agglomeration of Powders	□ £11.00	□ £6.00	□ £10.00
10. Aseptic Packaging	□ £11.00	□ £7.00	□ £11.00
11. EEC Regulations	□ £11.00	□ £6.00	□ £10.00
12. Toxicology of Food Additives	□ £12.00	□ £7.00	□ £11.50
13. Deep Fat Frying	□ £14.00	□ £8.00	□ £13.00
14. Viscosity of Foods	□ £12.00	□ £6.50	□ £10.50
15. Taste Panels in Food Science	□ £13.00	□ £8.00	□ £13.00
16. Taints in Food	□ £11.00	□ £6.50	□ £11.00
17. Microbial Toxins in Food	□ £13.00	□ £8.00	□ £13.00
18. Smoked Food Products	□ £11.00	□ £6.00	□ £10.00
19. Disposal of Waste Food Products	□ £15.50	□ £8.50	□ £14.00
20. Use of Glucose in Food Products	□ £10.50	□ £5.50	□ £10.00
21. Emulsifiers in Foods	□ £12.00	□ £7.00	□ £11.50
22. Stabilizers in Foods	□ £12.00	□ £7.00	□ £11.50
23. Staling and Antistaling Additives	□ £10.50	□ £5.50	□ £10.00
24. Catering Industry	□ £10.50	□ £6.50	□ £10.50
25. Antioxidants	□ £12.00	□ £7.00	□ £11.50
26. Nitrosamines	□ £10.50	□ £5.50	□ £10.00
27. Content and Analysis of Mercury in Foods	□ £11.50	□ £7.00	□ £11.00
28. Content and Analysis of Lead in Foods	□ £11.00	□ £6.00	□ £10.00
29. Heatable Packs	□ £10.50	□ £5.50	□ £9.50
30. Sulphur Dioxide in Food Products	□ £11.00	□ £6.00	□ £10.00
31. Lactic Acid Bacteria in Beverages and Food	□ £13.00	□ £8.00	□ £13.00
32. Colorants	□ £11.00	□ £6.00	□ £10.00
33. Browning of Foods	□ £11.00	□ £6.00	□ £10.00
34. Aflatoxins	□ £11.50	□ £7.00	□ £11.00
35. Antibiotic Properties and Residues in Food excluding Nisin	□ £10.00	□ £5.50	□ £9.50
36. Nisin	□ £10.00	□ £5.50	□ £9.50
37. Cadmium in Foods	□ £10.50	□ £6.00	□ £10.00
38. Coffee	□ £11.00	□ £6.50	□ £11.00
39. Sorbic Acid	□ £11.00	□ £6.00	□ £10.00
40. Arsenic in Foods	□ £10.00	□ £6.00	□ £10.00
41. Ascorbic Acid	□ £10.00	□ £6.50	□ £11.00
42. Thickeners and Gelling Agents	□ £9.50	□ £6.00	□ £10.00
43. Pseudomonadaceae and Food Processing	□ £10.00	□ £5.50	□ £9.50
44. Spores in Food	□ £9.00	□ £6.50	□ £10.50
45. Breadmaking	□ £11.00	□ £6.00	□ £10.00
46. Bread Properties	□ £10.00	□ £5.50	□ £9.50
47. Food Science and Technology Books	□ £16.00	□ £10.00	□ £18.00
48. Nitrates and Nitrates in Meat Products	• □ £11.00	□ £6.50	□ £11.00
49. Eggs and Poultry Meat	□ £16.00	□ £9.00	□ £14.50
50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	• □ £9.00	□ £6.00	□ £10.00
51. Meat Canning	• □ £11.00	□ £6.00	□ £11.00

* Only available from 1974.

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